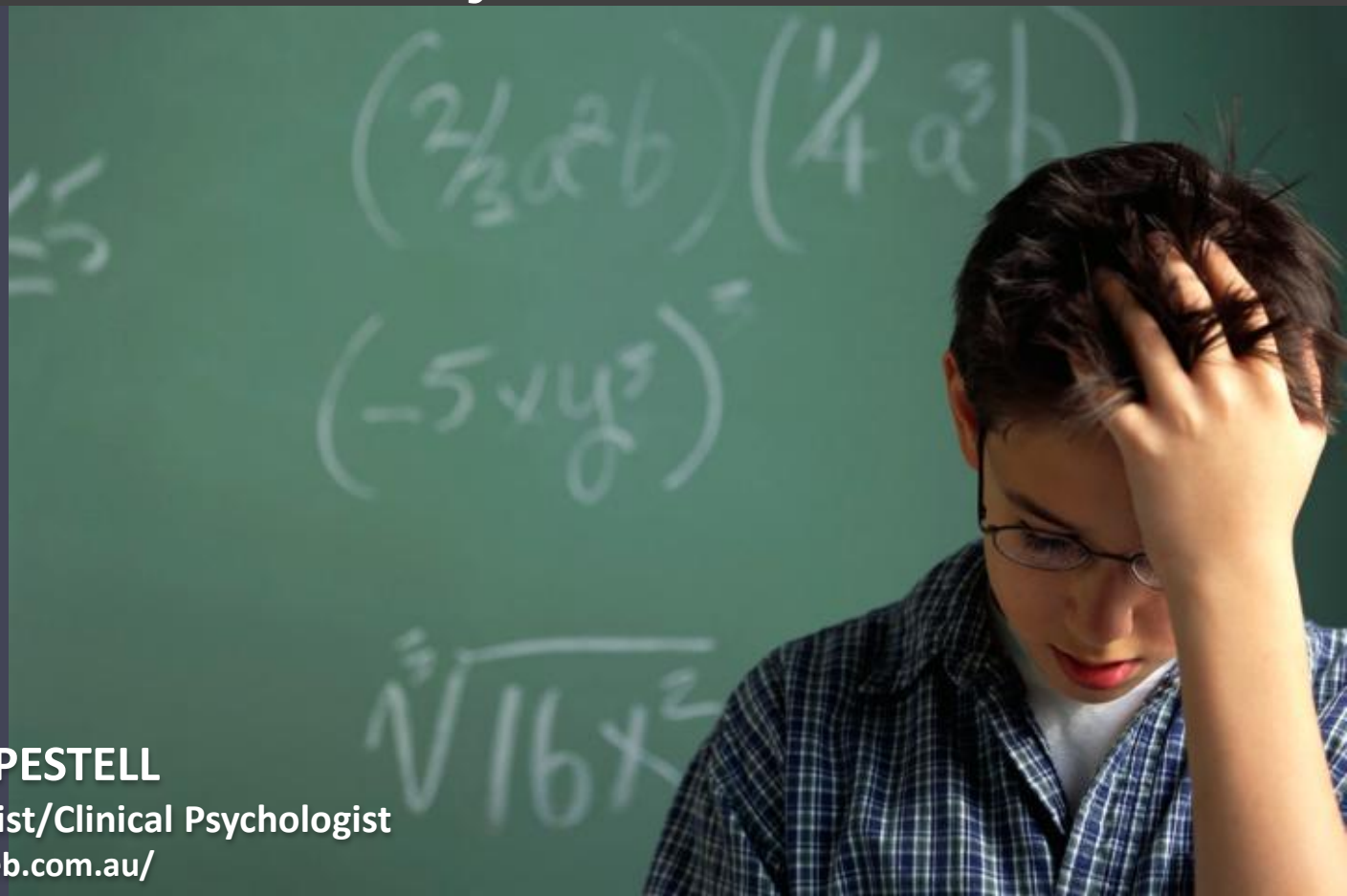
Moving the frontal lobe to the front of the class

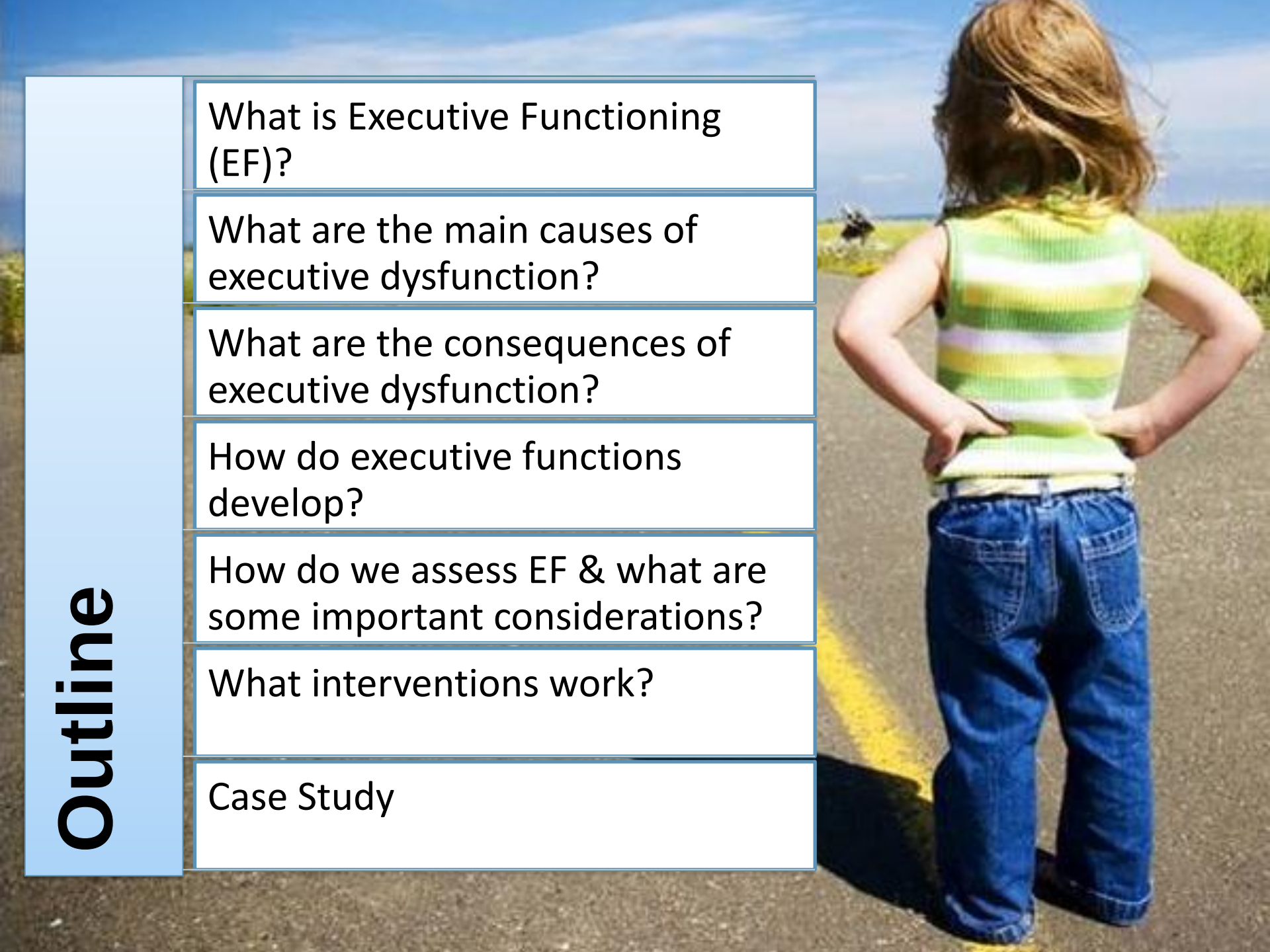
Recent developments with the assessment & remediation of executive dysfunction.



Professor Carmela PESTELL
Clinical Neuropsychologist/Clinical Psychologist
http://carmelapestell.vpweb.com.au/

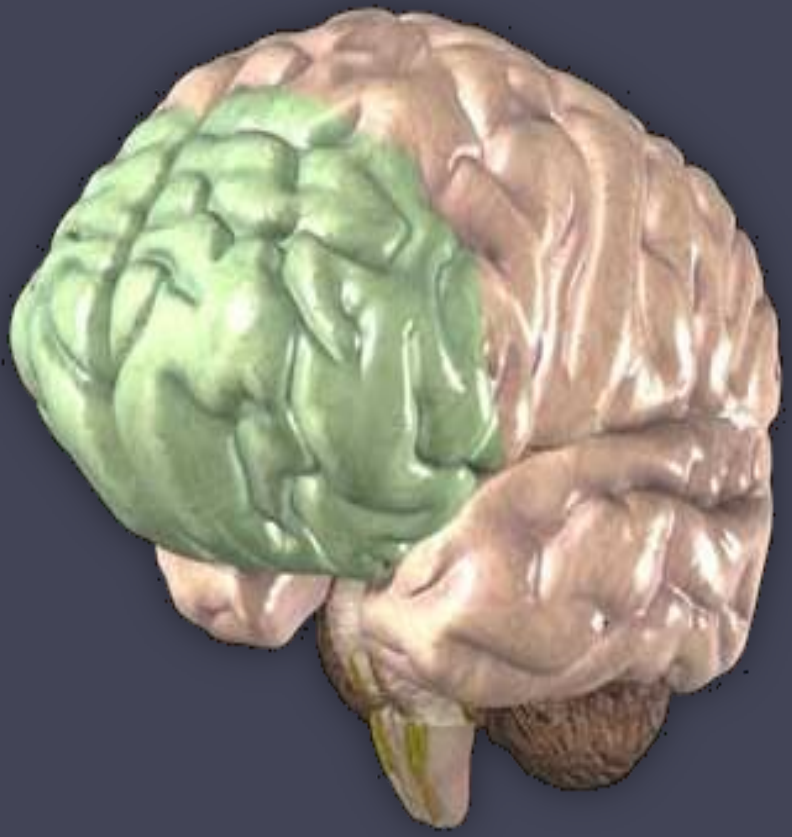
Outline

- What is Executive Functioning (EF)?
- What are the main causes of executive dysfunction?
- What are the consequences of executive dysfunction?
- How do executive functions develop?
- How do we assess EF & what are some important considerations?
- What interventions work?
- Case Study

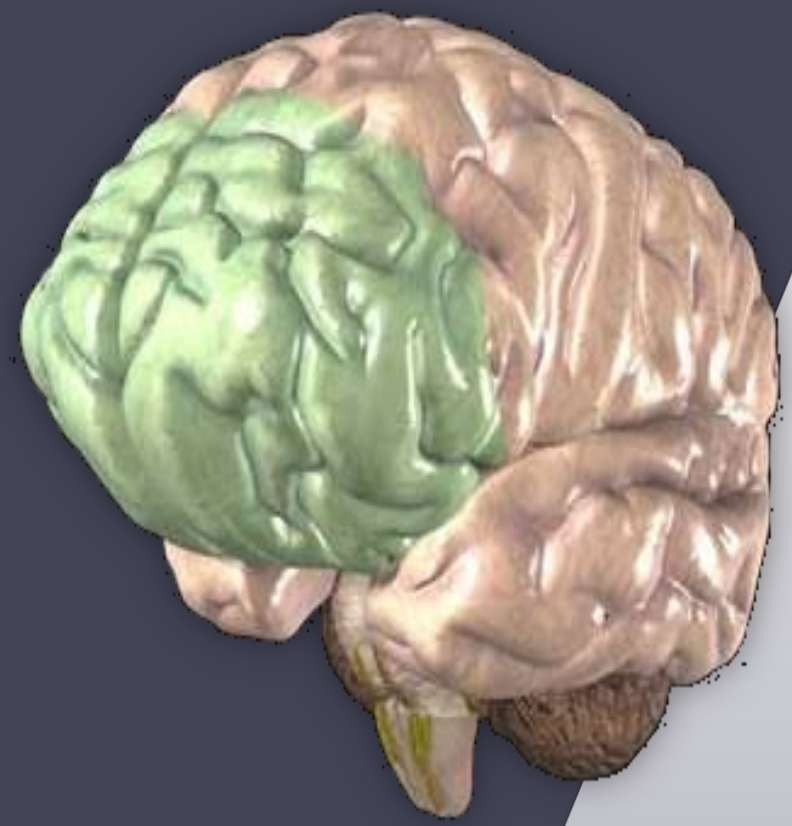


“All neural roads eventually lead to the frontal lobes” ....

(Kolb & Wishaw, 2003, p. 391).



The Prefrontal Cortex



Highest Order
Integration & Association

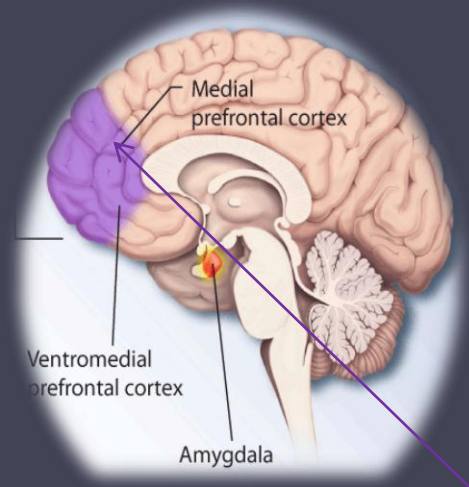
Controls flexible & adaptive behaviour

Stored experiences are brought on-line to assist in planning & modifying behaviour

Prefrontal Syndromes (e.g. Cummings, 1993)

Dorsolateral (dysexecutive)

- Verbal & nonverbal working memory
- Executive control
- Poor problem solving
- Analysis & synthesis

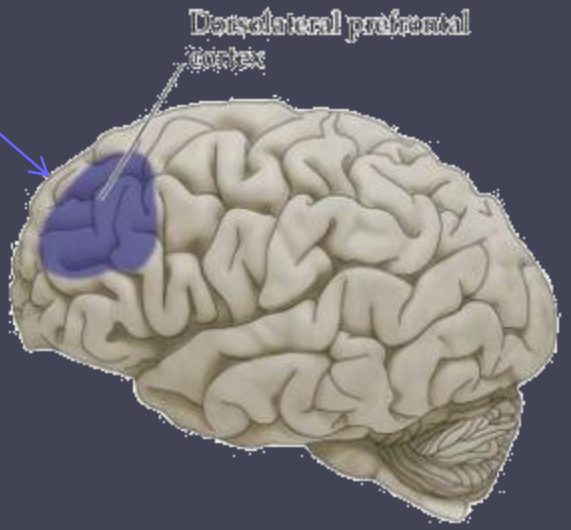


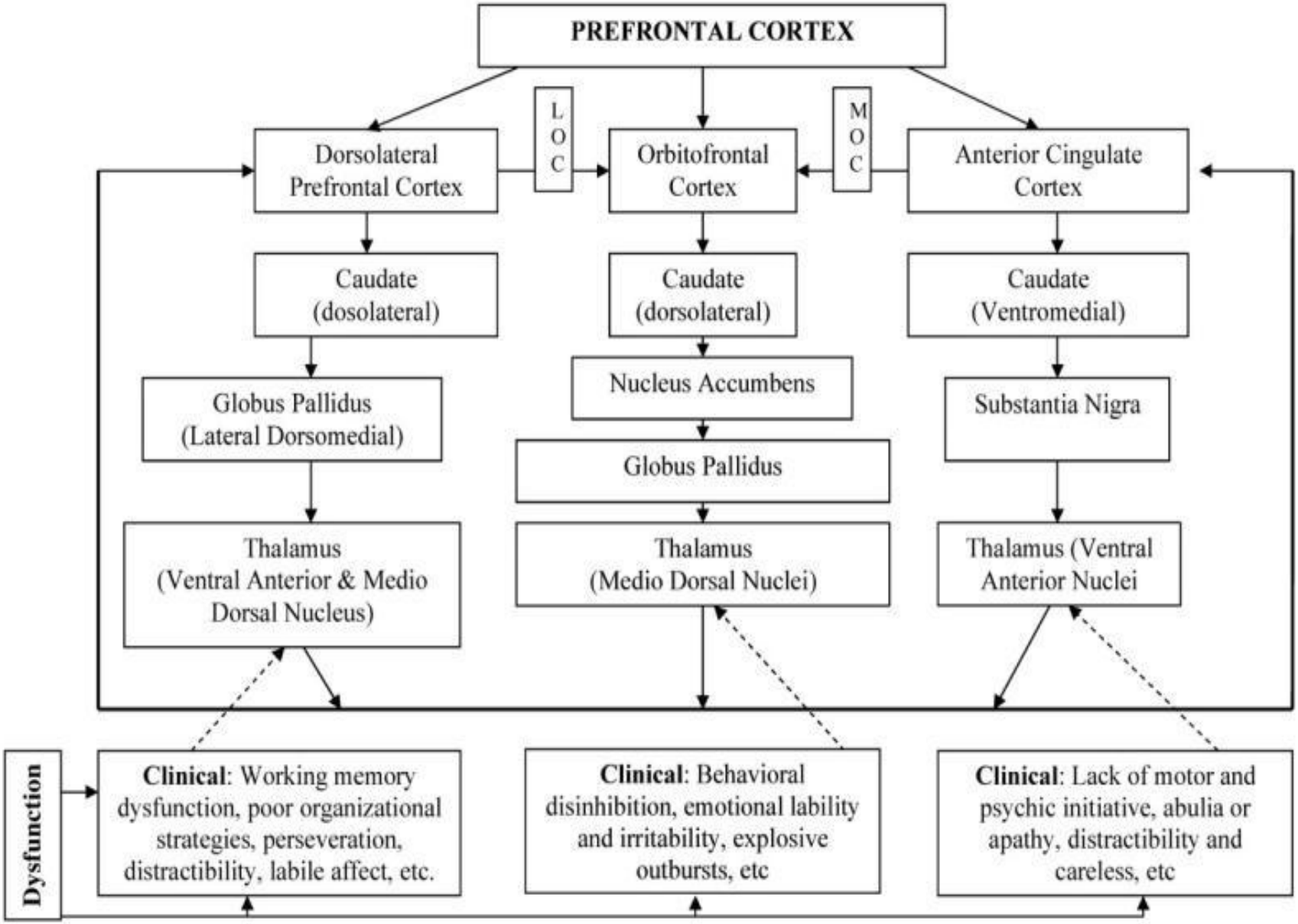
Orbitofrontal

- Behavioural inhibition
- Emotion/Social/Self Regulation i.e. emotional lability, immaturity, personality change

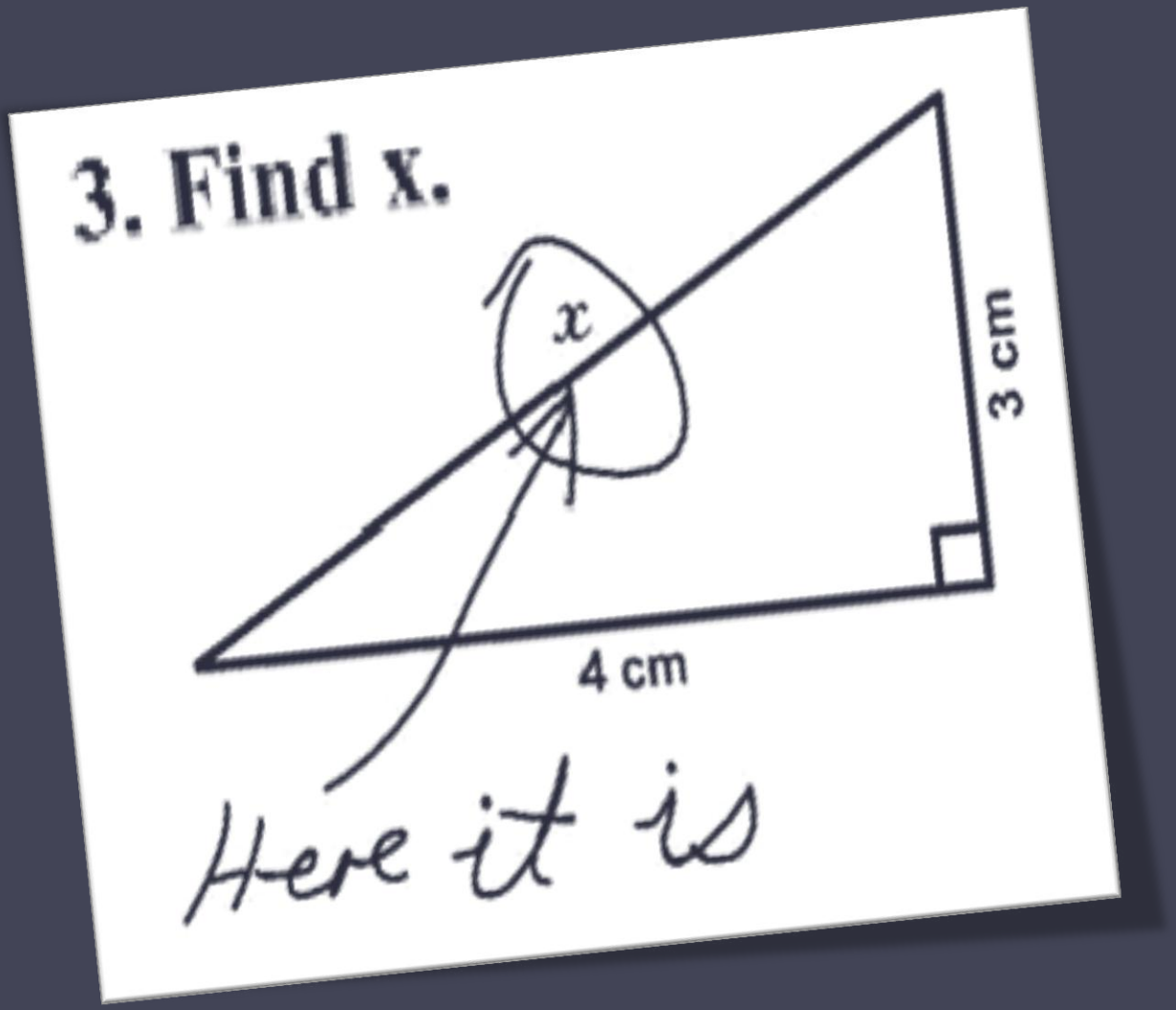
Medial (cingulate)

- Self-regulation of affect, arousal & motivation
- Decreased initiation, indifference



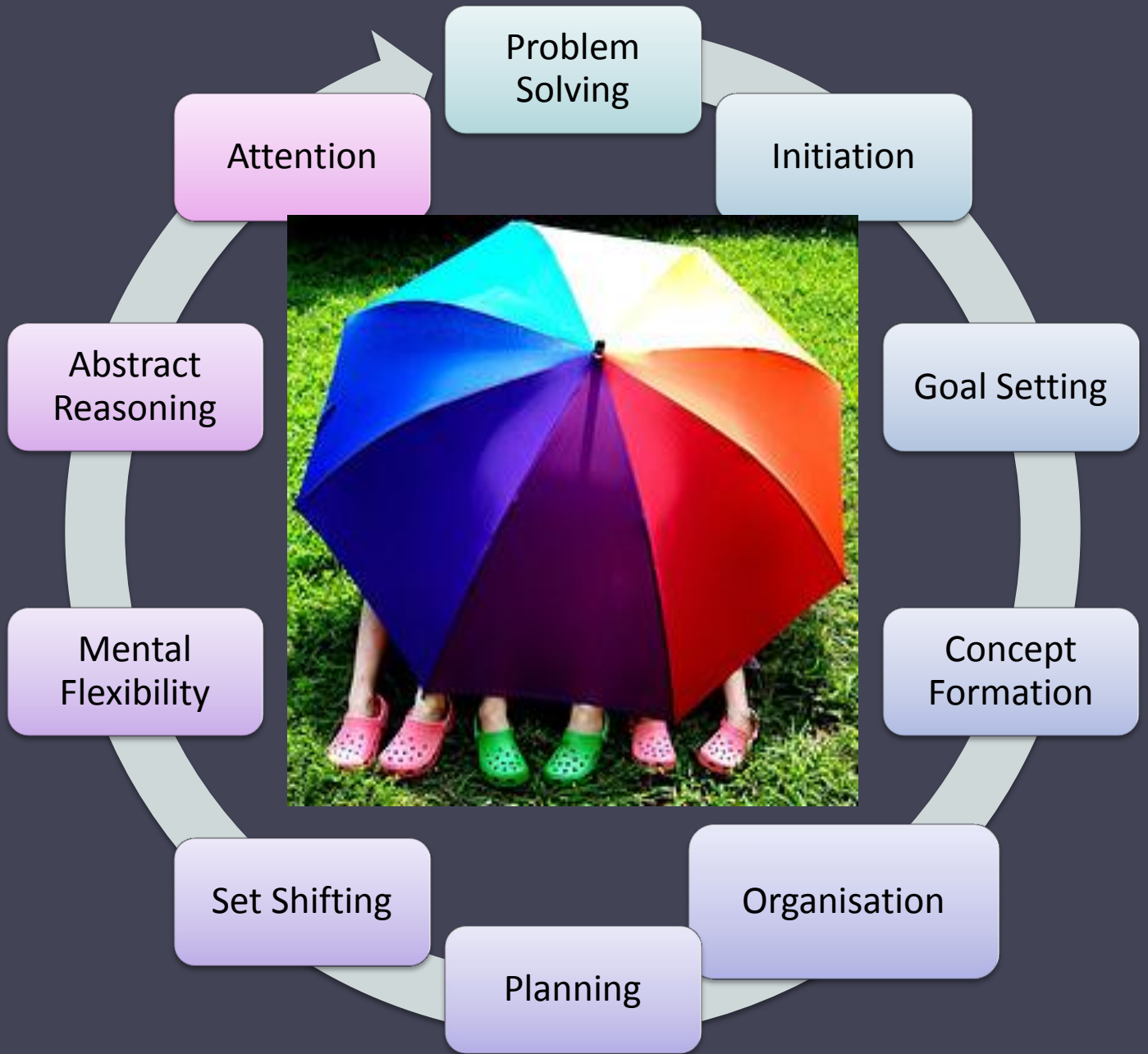


From: http://ebm.rsmjournals.com/content/233/8/941/F1.expansion.html



x = EF

“Cold” Components of EF



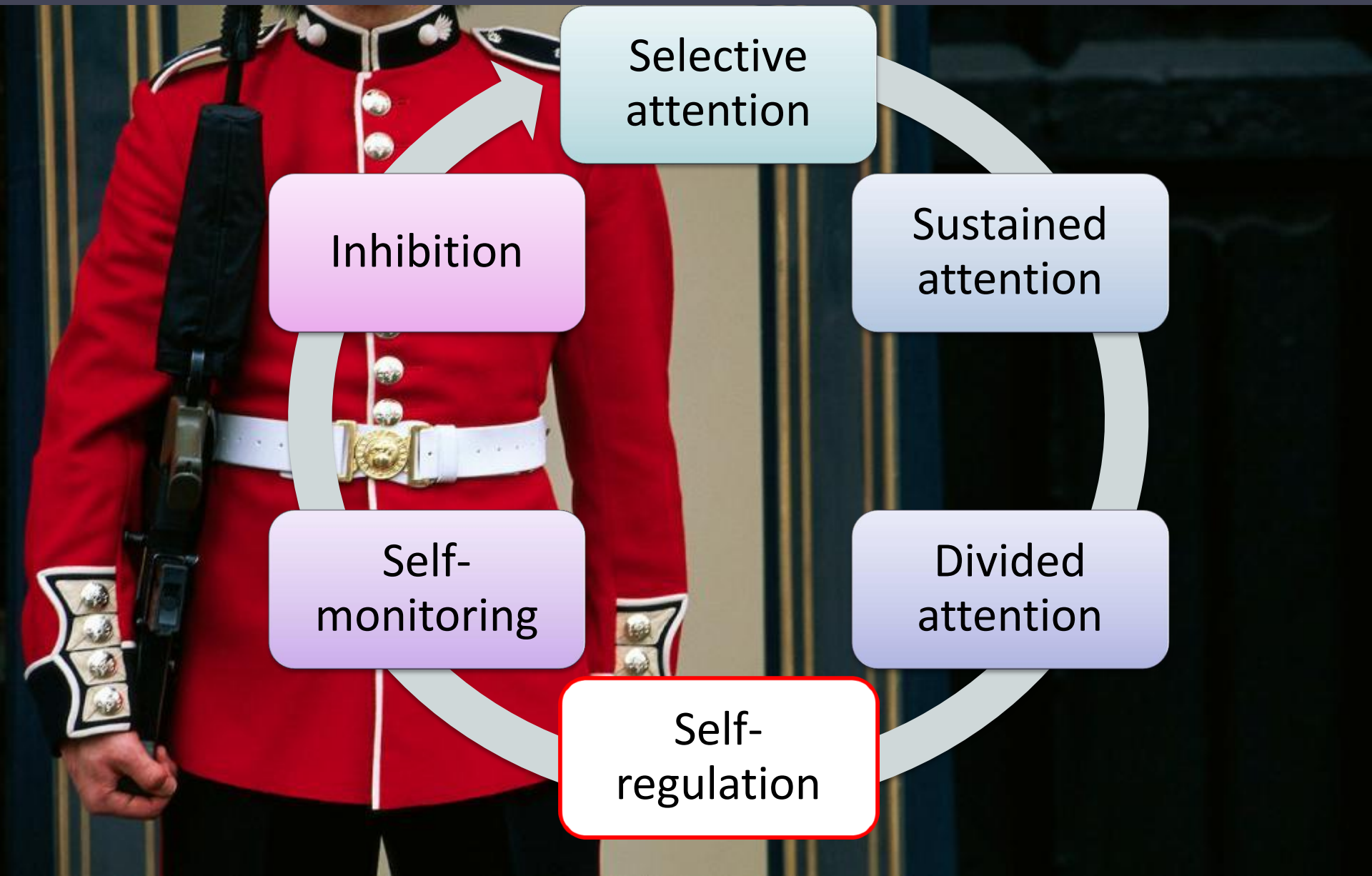
Working Memory

Enables one to hold information in mind...

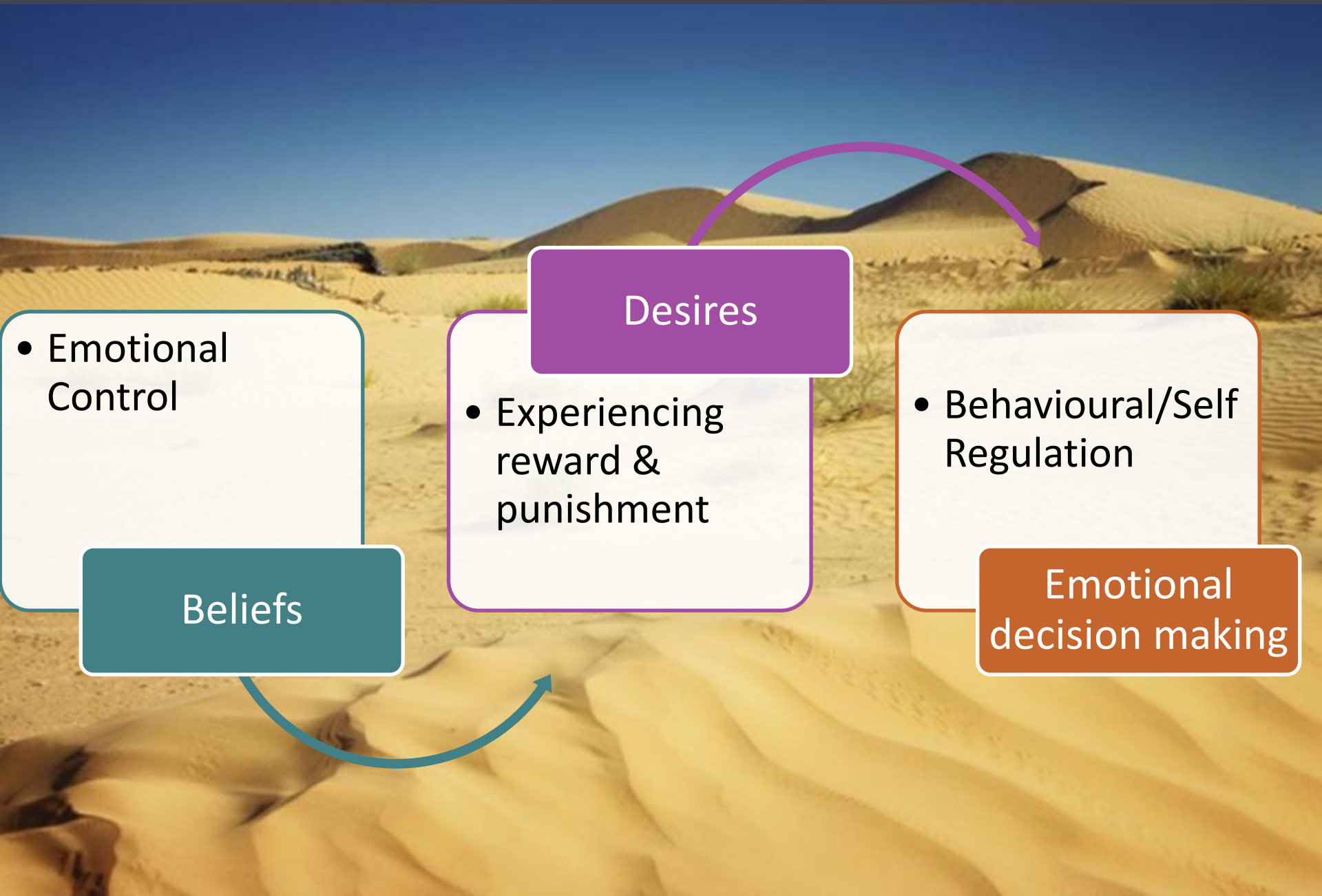
Perform mental manipulations & recall or...

Utilise the resulting information to form responses & to solve problems

Attentional Control



The “Hot” Components of EF



Memory problems in Executive Dysfunction…

Disruption to encoding, storage and retrieval of information

Difficulty retaining information long enough to execute steps

Forgetting to execute tasks or unable to use organisational skills to aid memory

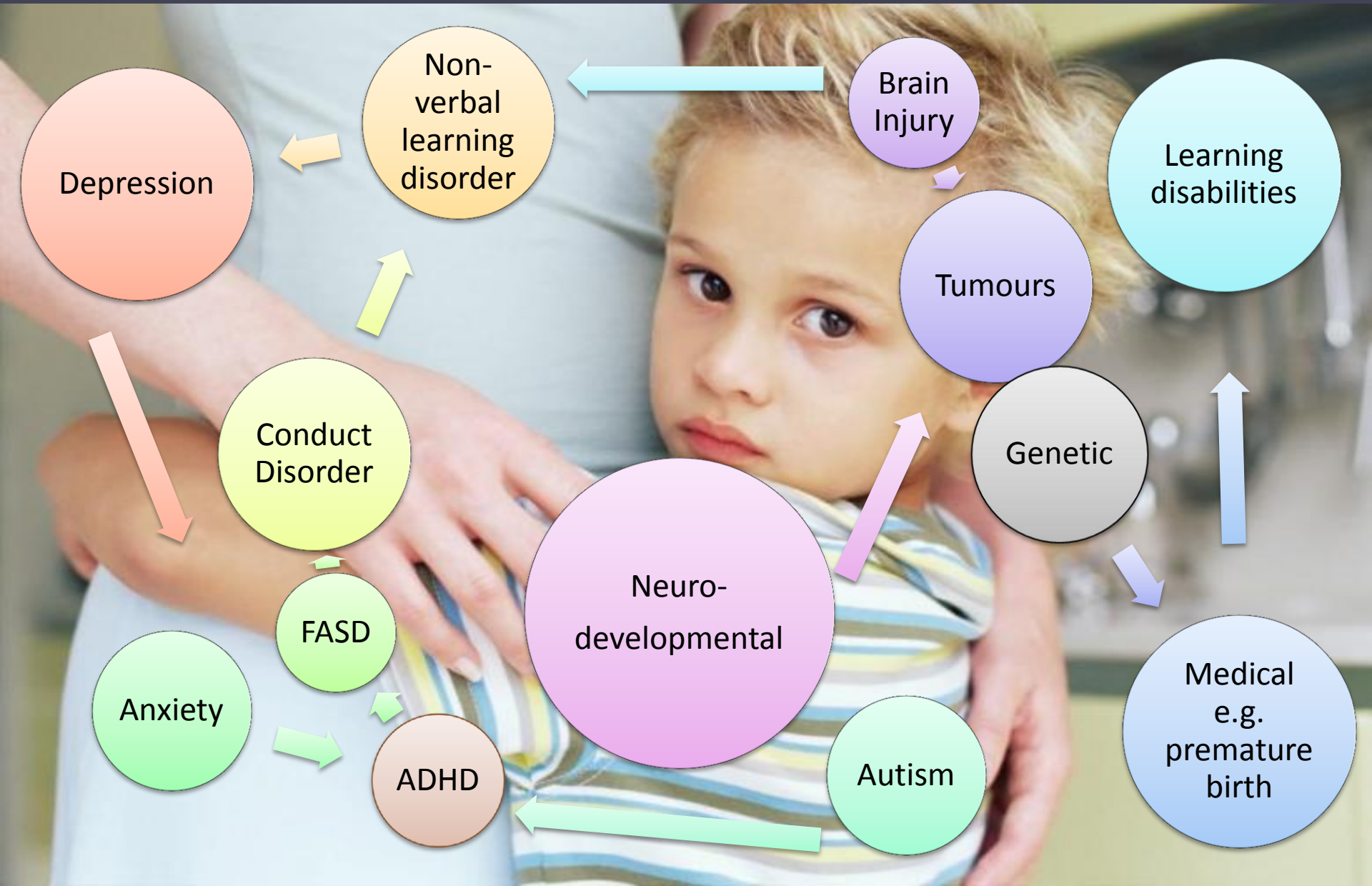
Recalling information out of sequence or temporal order (e.g. giving history or verbal directions)

Prospective Memory

Remembering what to do & when to do it

VIDEO

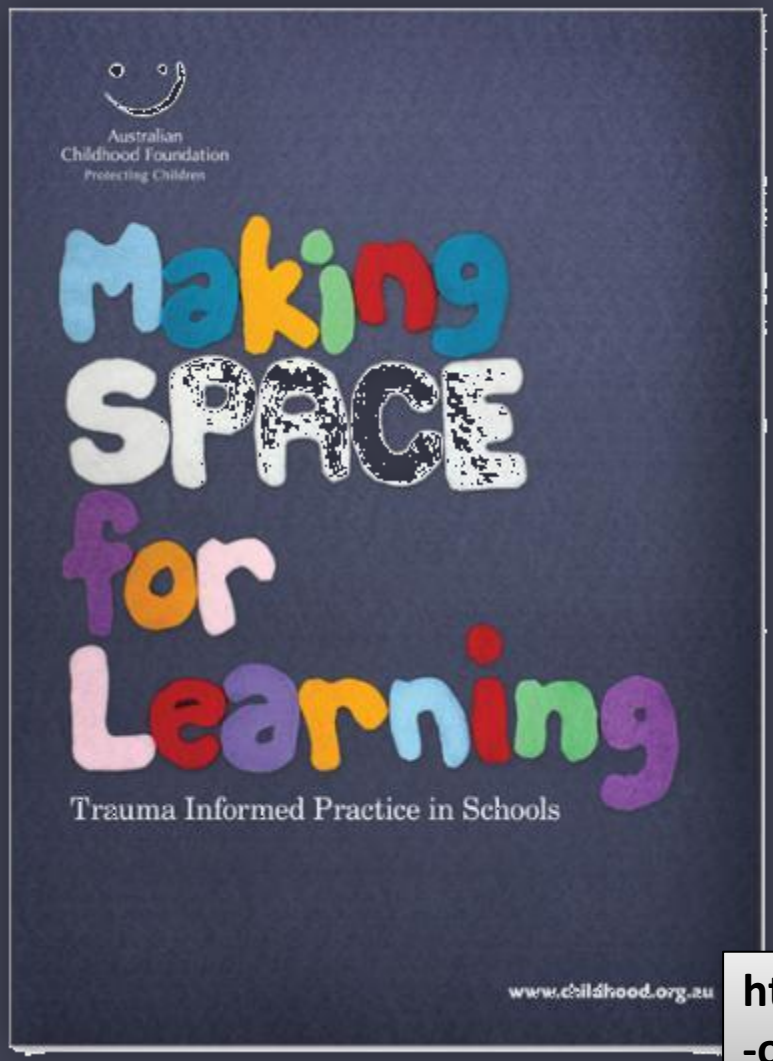
What causes EF deficits?

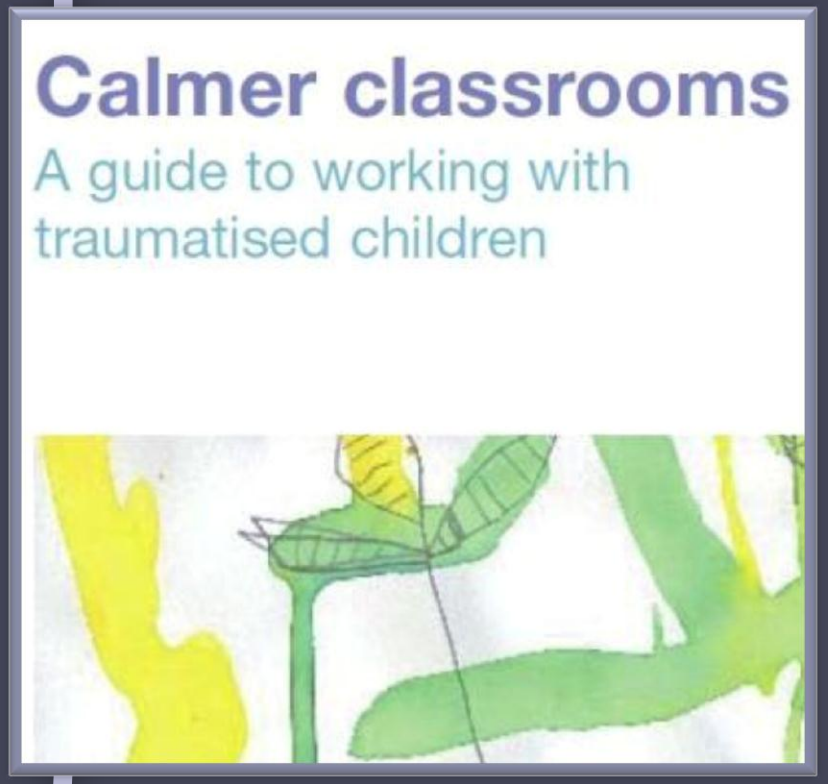


The effects of toxic stress on EF

Adverse environments resulting from neglect, abuse, and/or violence may expose children to toxic stress, which disrupts brain architecture & impairs the development of executive function.

VIDEO





http://www.childhood.org.au/training/smart-online-training

Australian Childhood Foundation

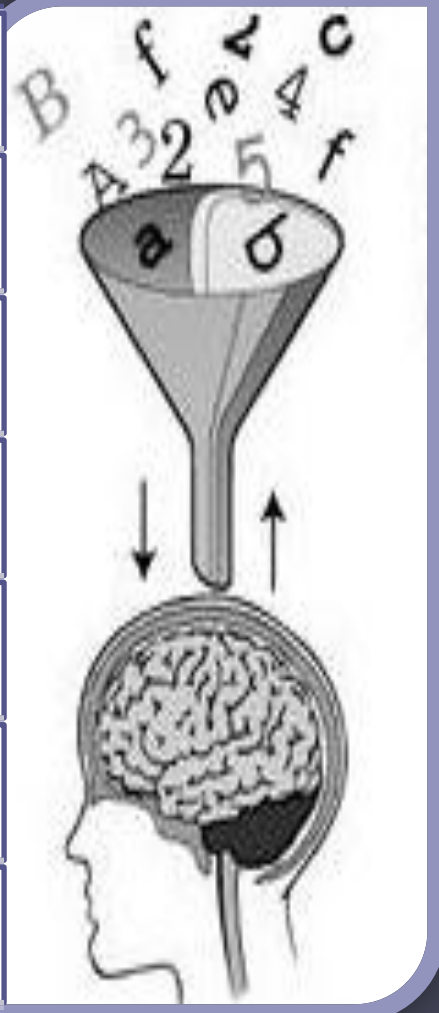
Long term implications

- Also has implications for relationships, career, managing finances & all aspects of life
- EF dysfunction predicts school readiness, later academic performance, as well as mental & physical health

Implications for the classroom

(Meltzer, 2007 & 2010)

Students who cannot 'unclog the funnel':	struggle with open-ended tasks because they are unable to prioritize & organize the various steps
	have difficulty shifting between different task components
	over-focus on the details, ignoring the bigger picture
	struggle to take notes or to outline because they lose track of the main ideas
	have difficulty checking their work without structure or guidance
	forget to hand in completed work
	have difficulty showing what they know &, in spite of their effort, they may be labelled as "lazy"



http://www.ncld.org/types-learning-disabilities/executive-function-disorders/executive-functioning-strategies-success-teaching-students

Social Cognition

- Socially vulnerable/overly trusting & immature
- Often scape goated & bullied
- Lack of self-awareness & self monitoring of errors
- Poor boundaries & lacking empathy/ability to see perspective from another point of view
- Difficulty interpreting their social world
- Inappropriate interactions, interpreting non-verbal cues & poor social skills

Implications of Executive Dysfunction

Communication

Disorganised conversation

Tangential, wandering narratives lacking in point & sequence

Failure to comprehend main theme or idea

7 year old boy (ABI 4 yrs)

How are a cat & a mouse alike?

I used to have a cat, my dad killed my rat, the rat was called Nigel because it got too big, I got this cat book & the cat is holding a rat in his mouth.

What is the thing to do if a boy or girl much smaller than yourself starts to fight with you?

Tell them to stop them...or put tape around their legs so they don't kick or punch or talk and stuff something in their mouth. That will stop them!

Integration Difficulties

- Difficulties holding on to information in sequence in order to process it
- Difficulties understanding the 'meaning' of multi-step information – fragmented perceptions
- Difficulties with the speed & accuracy of information processing;
- 'Information overload'
- Difficulties between 'knowing' and 'doing'

Difficulties with integration can impact on:

- ✓ Attention / Concentration
- ✓ Memory
- ✓ Problem-solving
- ✓ Abstraction / Inferencing
- ✓ Language

Example of Initiation Difficulty

Patient: *The sandwich is burning*

- **OT:** *What should you do?*

Patient: *Turn off the stove* [no action initiated, sandwich continues to burn]

- **OT:** *Why don't you?*

Patient: *OK* [no action initiated, smoke rising from pan]

OT: *Turn off the stove*

Patient: *OK I am* [no action initiated: thick smoke rising from pan]

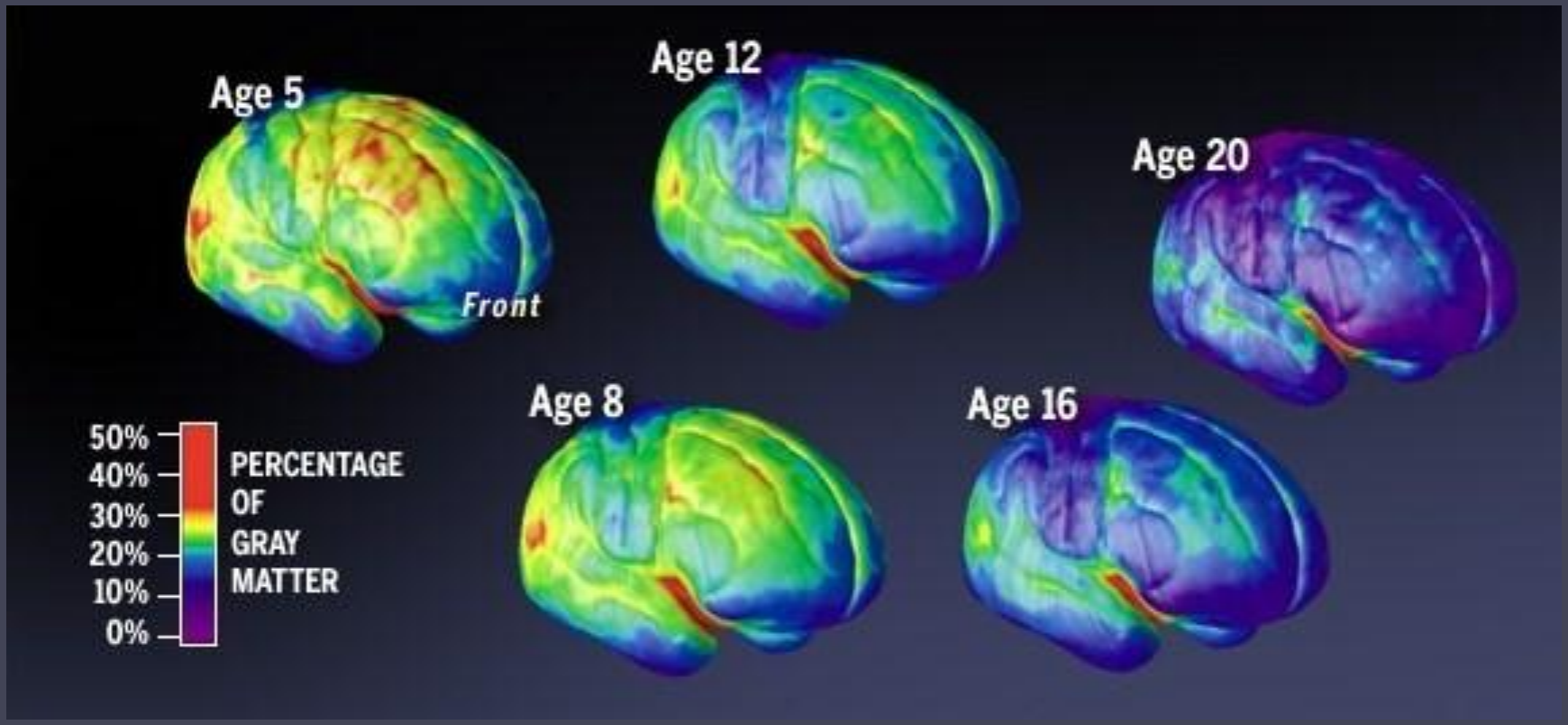
OT: *Turn off the stove now!!*

Patient: *I am* [no action initiated; therapist turns off stove]

The development of Executive Functions

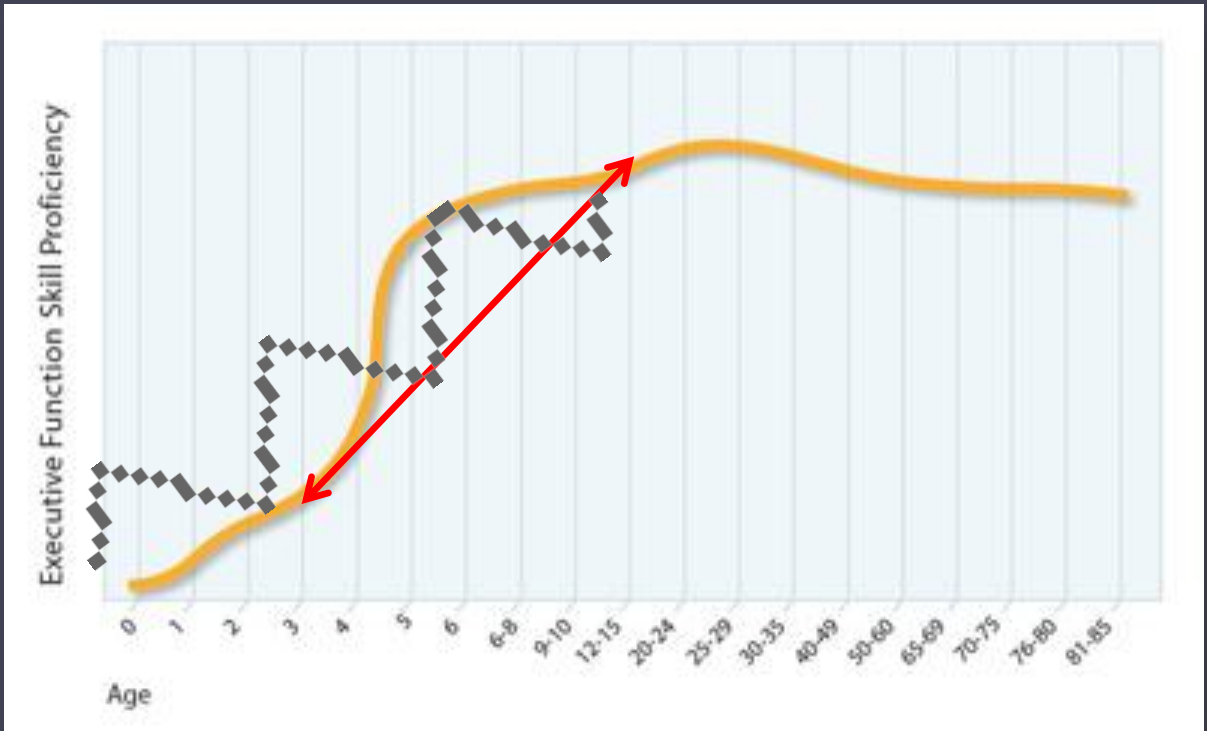
Whilst executive skills develop from infancy, they may not be measurable until late childhood.

Identification of EF deficits cannot reliably occur until a stage at which they are present & accessible in the child.



http://csulapeep.org/articles/2004/teenstick.html

The development of EF



Center on the Developing Child at Harvard University (2011). *Building the Brain's "Air Traffic Control" System: How Early Experiences Shape the Development of Executive Function: Working Paper No. 11*. Retrieved from www.developingchild.harvard.edu

Some popular misconceptions

Children will naturally learn to control impulses, pay attention & retain information as they develop without help

Children with EF dysfunction are just naughty & are to blame

Focusing on EF skills won't help academic performance (especially literacy/numeracy)

Executive Function Difficulties: Why?

"Parents, teachers & others involved with a child with EF difficulties must be careful not to attribute the particular **production** deficits they observe to character flaws or consciously chosen states of mind, such as laziness, lack of motivation, apathy, irresponsibility, or stubbornness. Rather, it must be understood that the behaviors that they are observing emanate from difficulties that are rooted in brain function" (McClosky, 2009).

Enhancing and Practicing Executive Function Skills with Children from Infancy to Adolescence

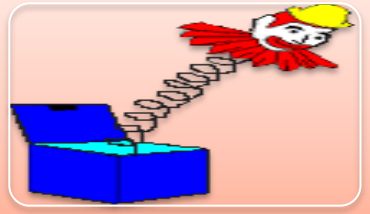


Center on the Developing Child HARVARD UNIVERSITY

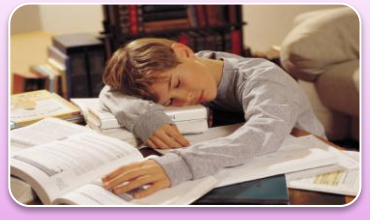
Assessment Challenges (Golden & Hines, 2011)

As the brain develops throughout childhood interpretation of EF tests must be more cautious than in an adult

Performance on EF tests, especially in younger children are more diffuse, making long-term predictions more difficult & less reliable.



The “element of surprise” - past experience with the tests must be considered a major interpretive factor to a greater degree than tests of achievement or tests of intelligence.



Performance on one EF task might not have predictive validity for other EF tasks or real world functioning

"As a consequence, the skills of the early-developing child over the long term may be overestimated & the long-term potential of the late-developing child underestimated"

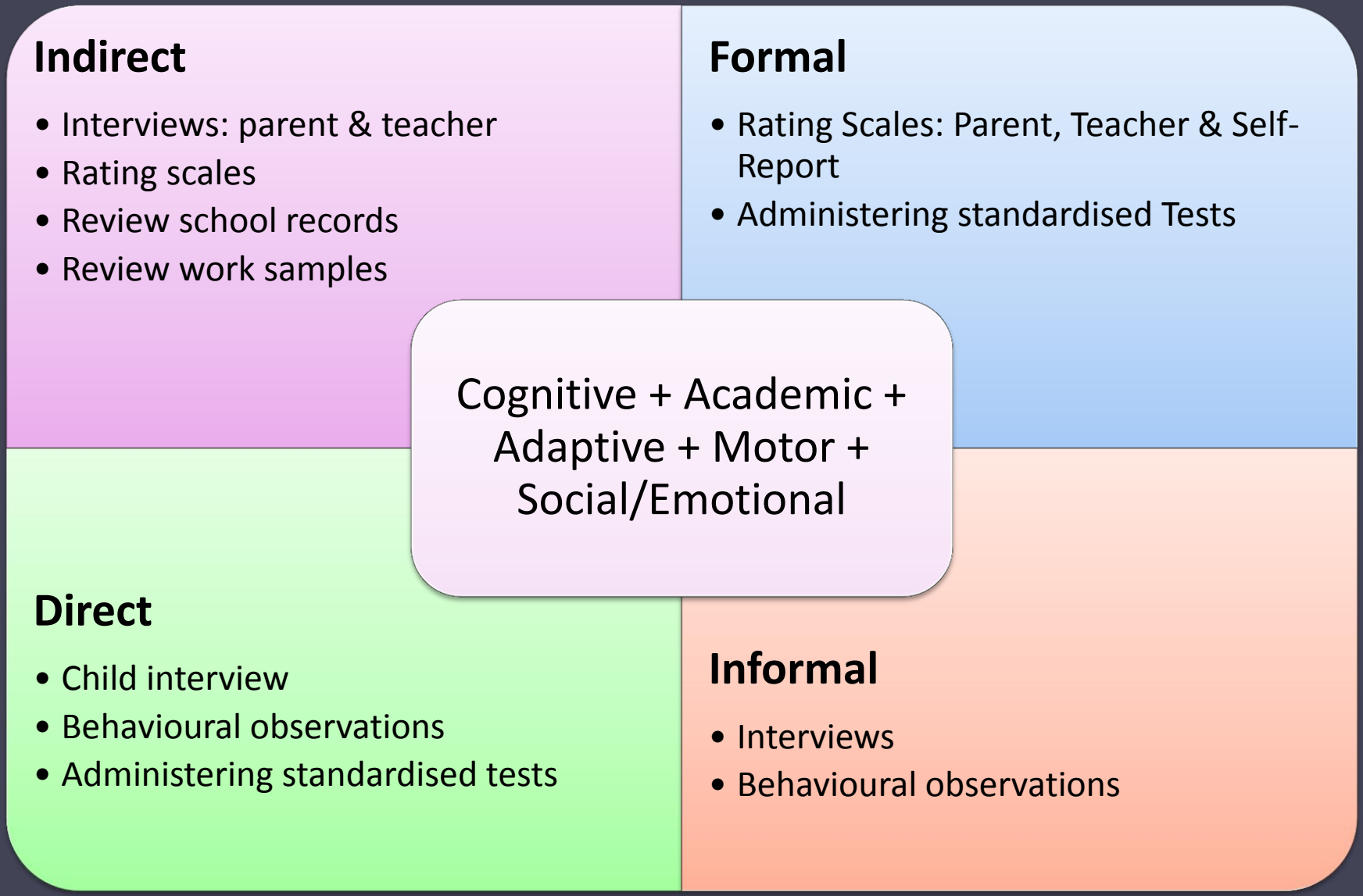
(Golden & Hines, 2011)

Test interpretation is challenging

So why is there not just one test of executive functioning?

Because EF's are multidimensional so our assessments need to be to!

EF Assessment Matrix (McClosky, 2014)



IQ testing: Beware the limitations

Adaptive Functioning

Acquired Skill	Adaptive Behaviour
Can tie shoe laces	Reties shoe laces that are trailing before getting on an escalator
Knows the emergency telephone number	Able to recognise an emergency and use the number
Uses the telephone without assistance	Uses the telephone appropriately
Can count money	Understands the value
Can catch a bus	Knows what to do if there is a bus strike & no bus arrives
Responds appropriately to a hazard sign	Spots a hazard in the first place

Remember...Adaptive functioning is NOT always correlated with IQ

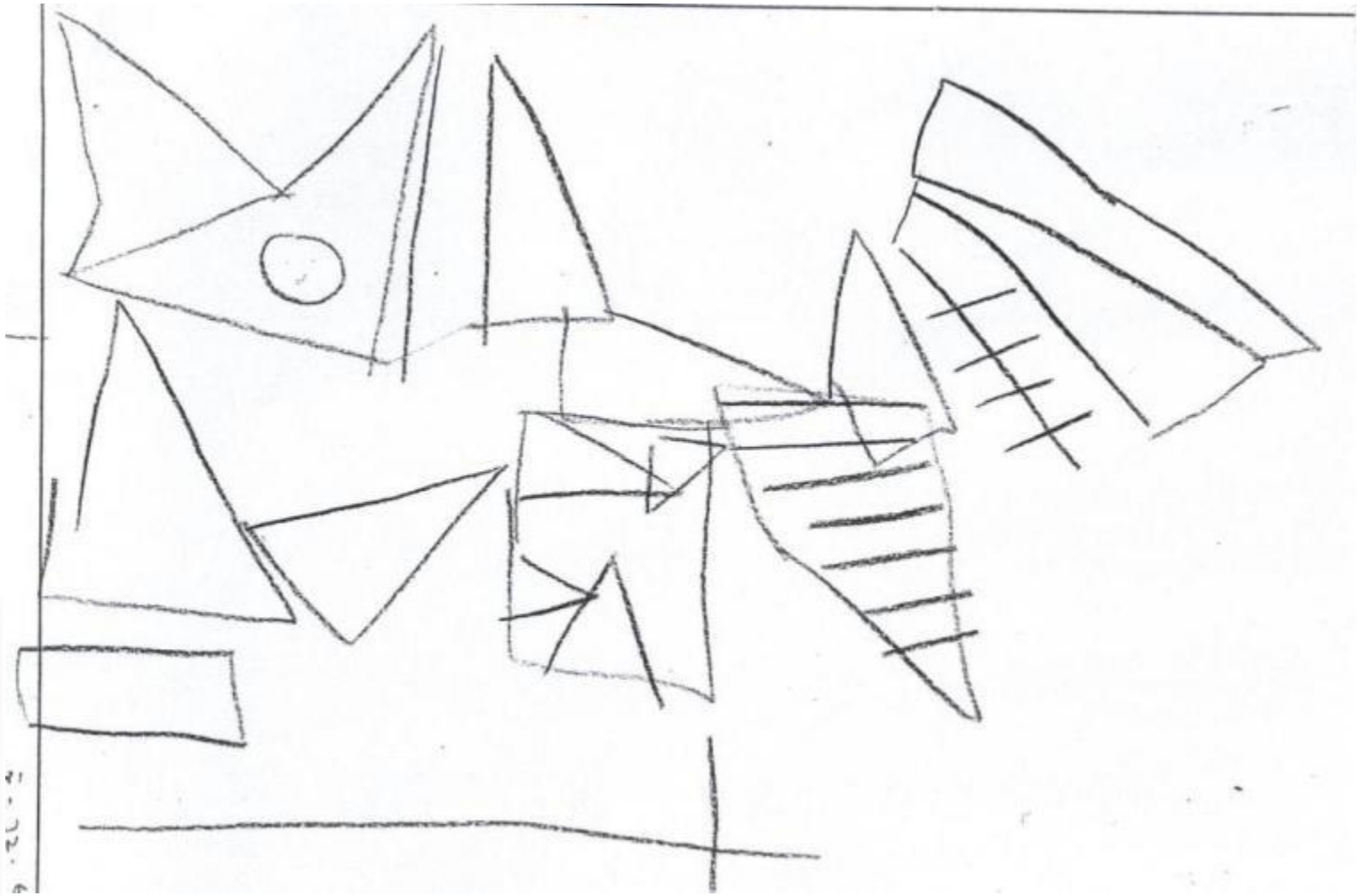
Tests of Executive Functioning

(See Chan, Shum, Toulopoulo & Chen, 2008 for a review)

- NEPSY-II (e.g. Animal Sorting, Auditory Attention, Design Fluency, Inhibition, Theory of Mind, Word Generation)
- Tower of Hanoi or London
- Wisconsin Card Sorting Test (WCST)
- Stroop Colour-Word Test
- Go-No-Go
- Fluency (e.g. Controlled Word Association Test)
- Trail Making Test

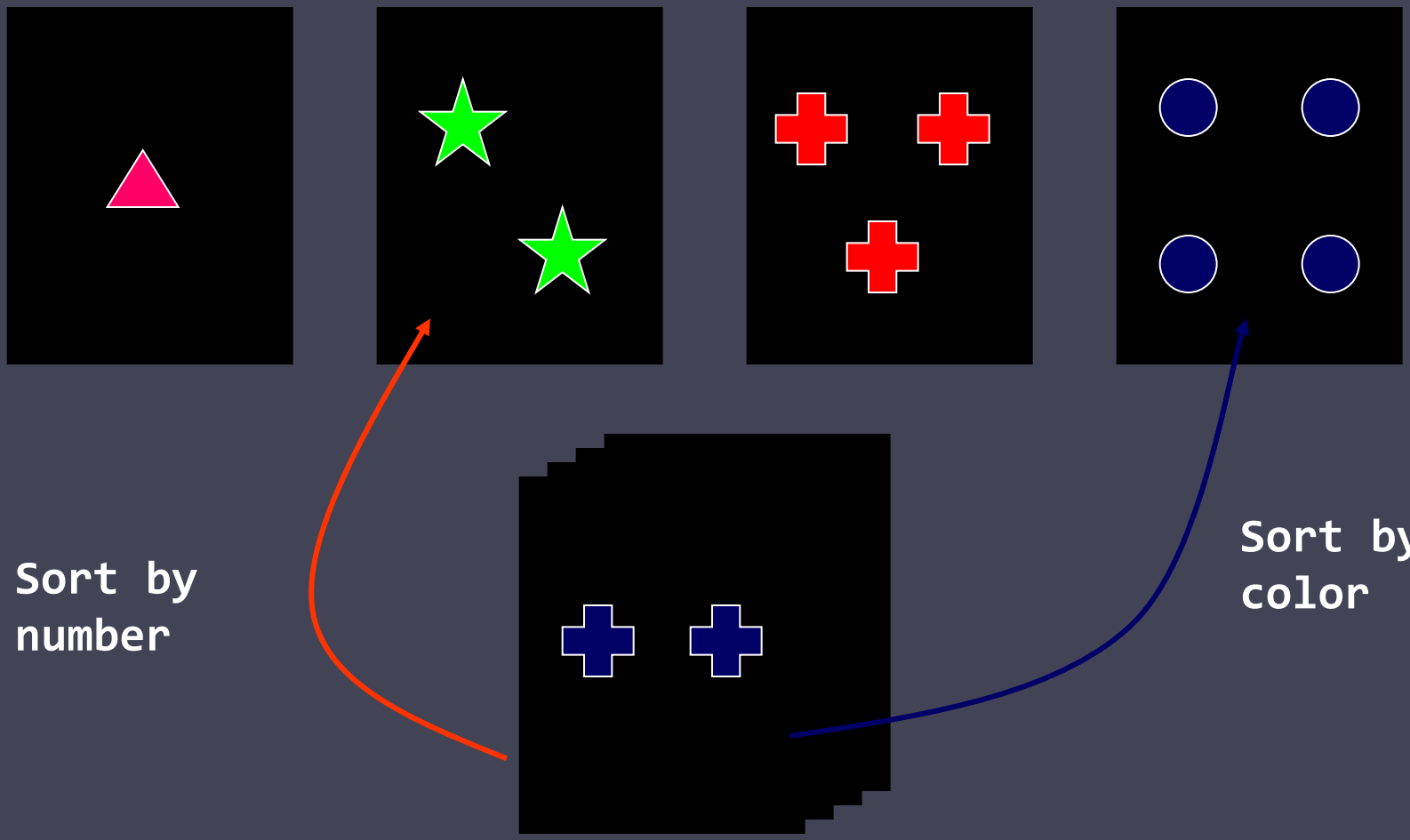
Delis-Kaplan Executive Function Scale

- Twenty Questions
- Card Sorting Test
- Colour-Word (Stroop) Test
- Trails
- Verbal Fluency
- Design Fluency
- Proverb Test
- Word Context Test
- Tower



1234567890

Wisconsin Card Sorting Test



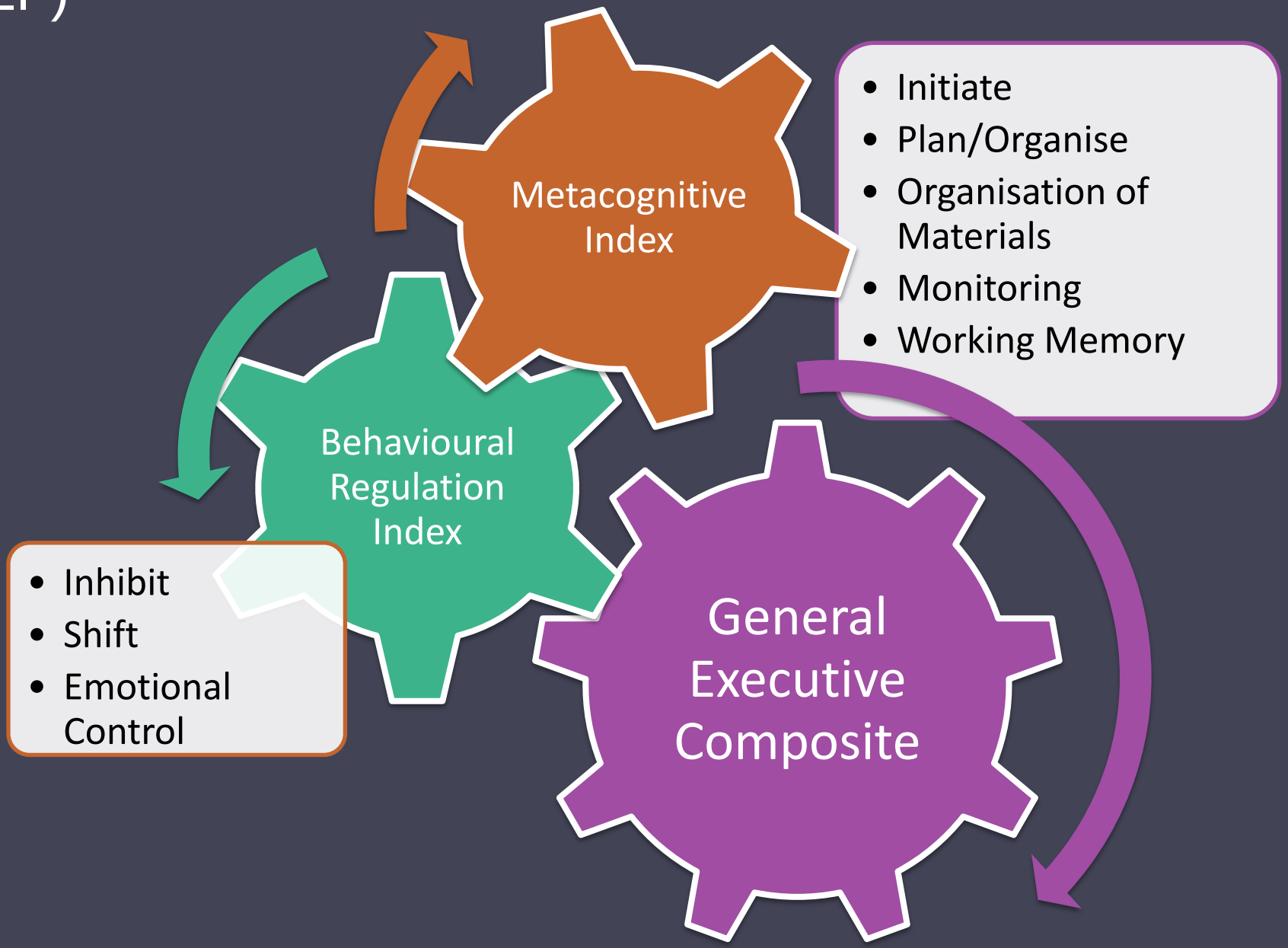
Sort according to unspoken rule; examiner changes rule – can child adapt to new rule?

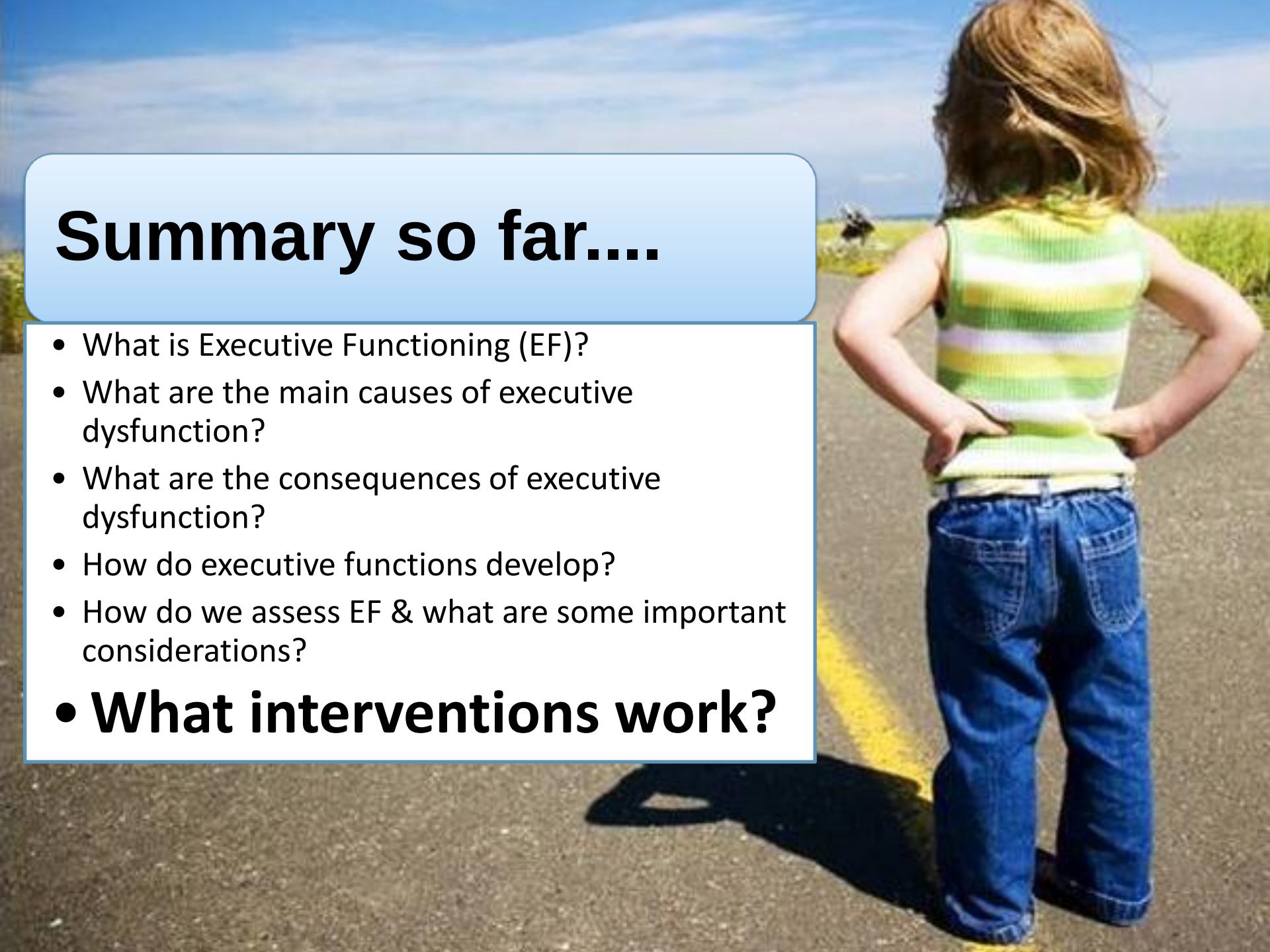
"Assessment that captures a child's everyday functioning in the context of real-world demands is often more informative than traditional neuropsychological measures alone & that interventions that improve functioning in the real-world environment are most useful" (Gioia et al., 2010)

Behaviour Rating Scales

- **Child Behaviour Checklist (CBCL)**
- **Conners' Parent & Teacher Rating Scales (CBRS)**
- Vanderbilt Assessment Scales
- ADHD Checklist (DePaul et al., 1998)
- SNAP-IV Teacher & Parent Rating Scales
- Brown Attention Disorder Scales for Children
- Brown ADD Scales for Adolescents & Adults
- Strengths & Weaknesses of Attention Scale (SWAN)
- Diagnostic Rating Scale (DRS),
- **Behaviour Rating Inventory of Executive Functioning (BRIEF)**

Behavioural Rating Inventory of Executive Function (BRIEF)





Summary so far....

- What is Executive Functioning (EF)?
- What are the main causes of executive dysfunction?
- What are the consequences of executive dysfunction?
- How do executive functions develop?
- How do we assess EF & what are some important considerations?
- **What interventions work?**

So what can we do?

"The strategies gave me a structure so that I could put boundaries & parameters around those whizzing little molecules in my mind & turn them into something that really made sense"

Why is it important?

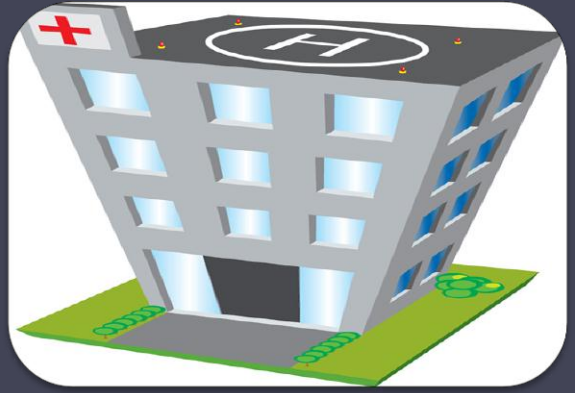
- Builds self-esteem
- Enhances learning &

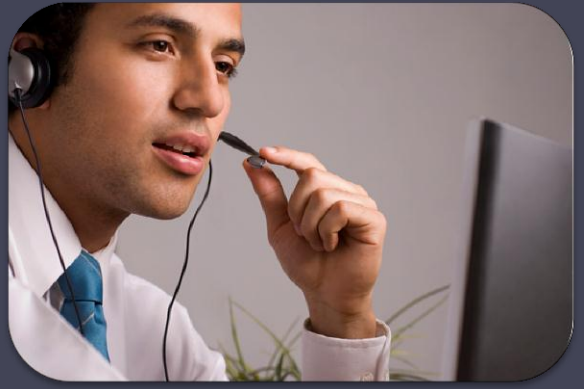
  improves academic outcomes
- Improves independence & efficiency
- Increases social awareness

Remember:

kids with the weakest EF (including disadvantaged) benefit most from interventions

How can we help?





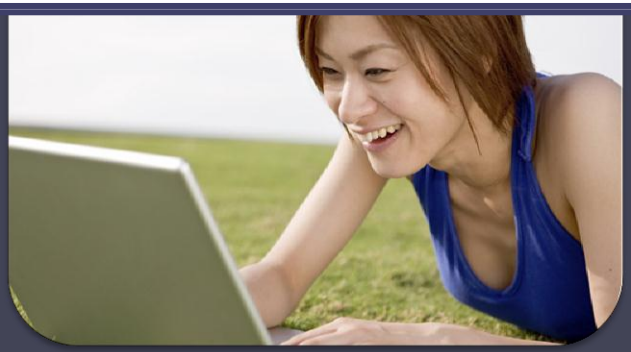
Restoration:

Cognitive training & exercises directed towards strengthening & restoration of function

Compensations:

Tools & techniques to allow functioning in spite of disabilities

Management of EF dysfunction



Accommodations/Restructuring:

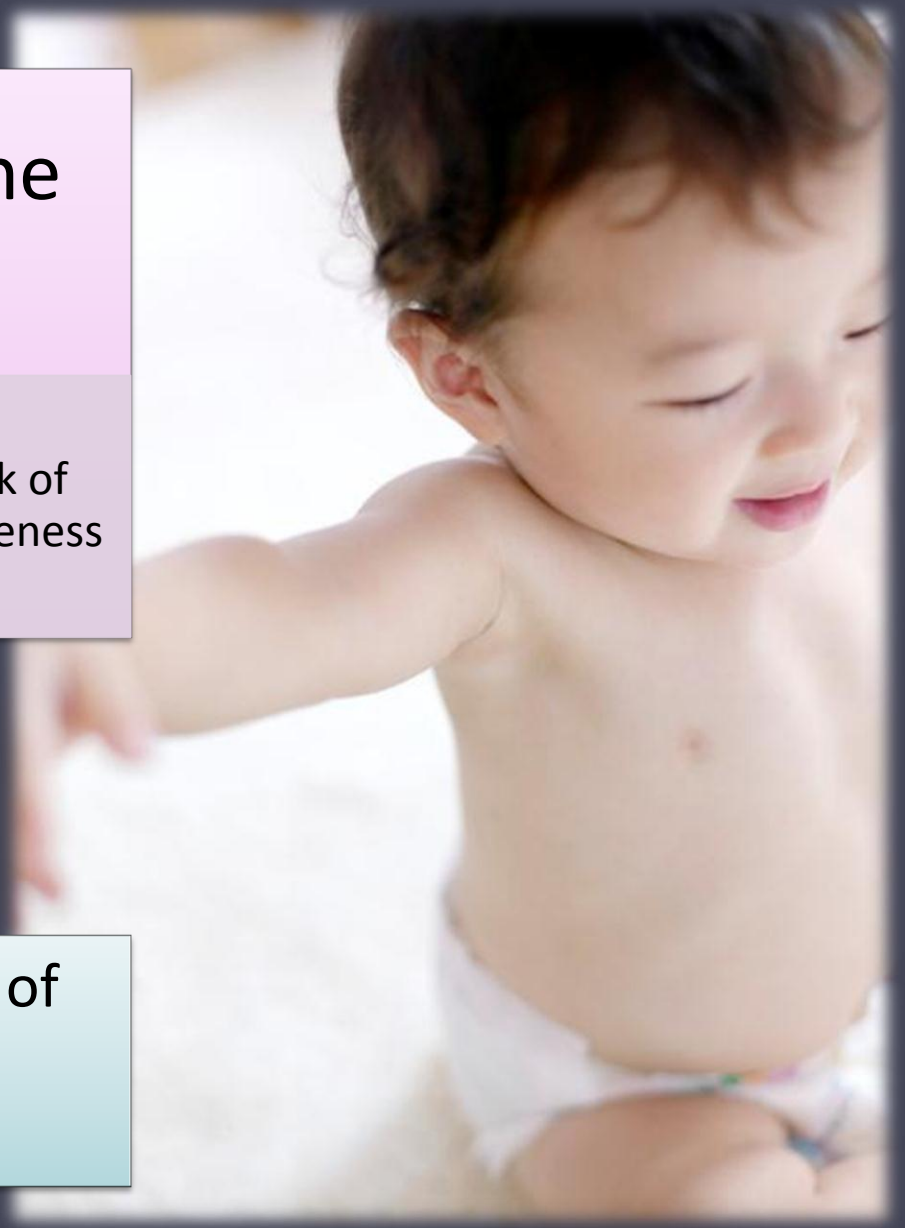
Changes in the environment of child

EF Interventions (McCloskey, 2009)

1) Decide are problems the result of?

Deliberate choice	Innate deficiency	Maturational delay	Lack of awareness

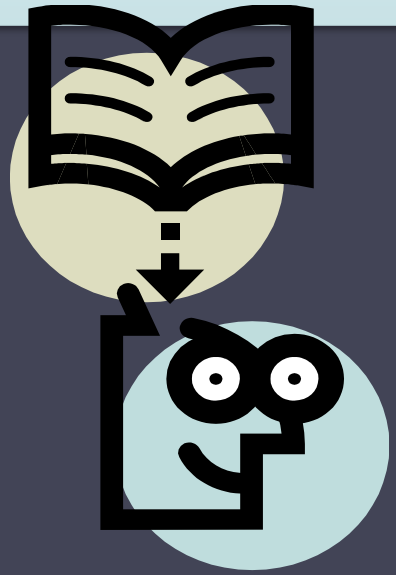
2) Consider individual EF profile of child & main areas to target



Executive Functions & School performance (McClosky, 2009)

Many new learning situations are structured in ways that **reduce** the need for strong executive direction or control.

In contrast, **demonstrating** what has been learned usually requires significant involvement of executive control processes.



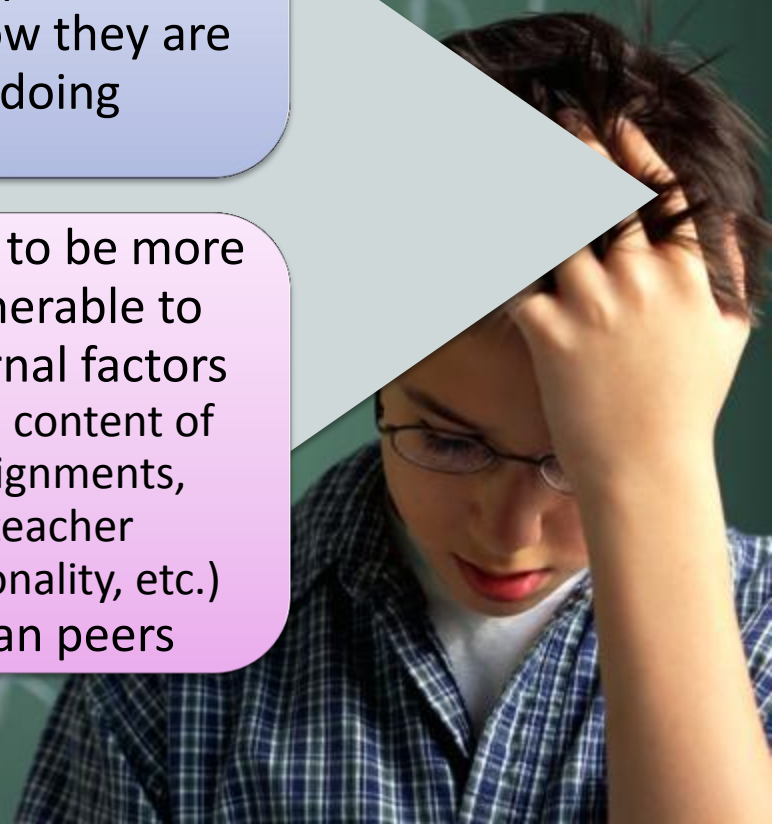
Executive Dysfunction: a Performance Deficit

Know what to do but have trouble doing it consistently (performance disability)

Often cannot accurately predict how they have performed or how they are doing

May have trouble getting started & keeping going

Seem to be more vulnerable to external factors (e.g., content of assignments, teacher personality, etc.) than peers



Intervention: What Works?

Cooper-Kahn, J., & Dietzel, L. (2008).

Late, Lost, & Unprepared. A Parent's Guide to Helping children with Executive Functioning.

Two-Pronged Approach

- Short-term: individualized expectations, support & accommodations
- Long-term: building independent skills

Short-term interventions – are they relevant?

Build a "prosthetic" environment

Adapt the environment

- Adapt the task
- "Lend" executive competence

Going the Distance

Strengthen the executive system & build a repertoire of effective self-management skills.

The Long-term Vision: Build Independence

Allow individuals to be competent to manage life on their own.

How to help: An Overview

(From Cooper-Kahn & Dietzel,2008)

Balance goals:

*1) helping **manage demands** in the short run*

*2) **building independent skills** for long-term self-management*

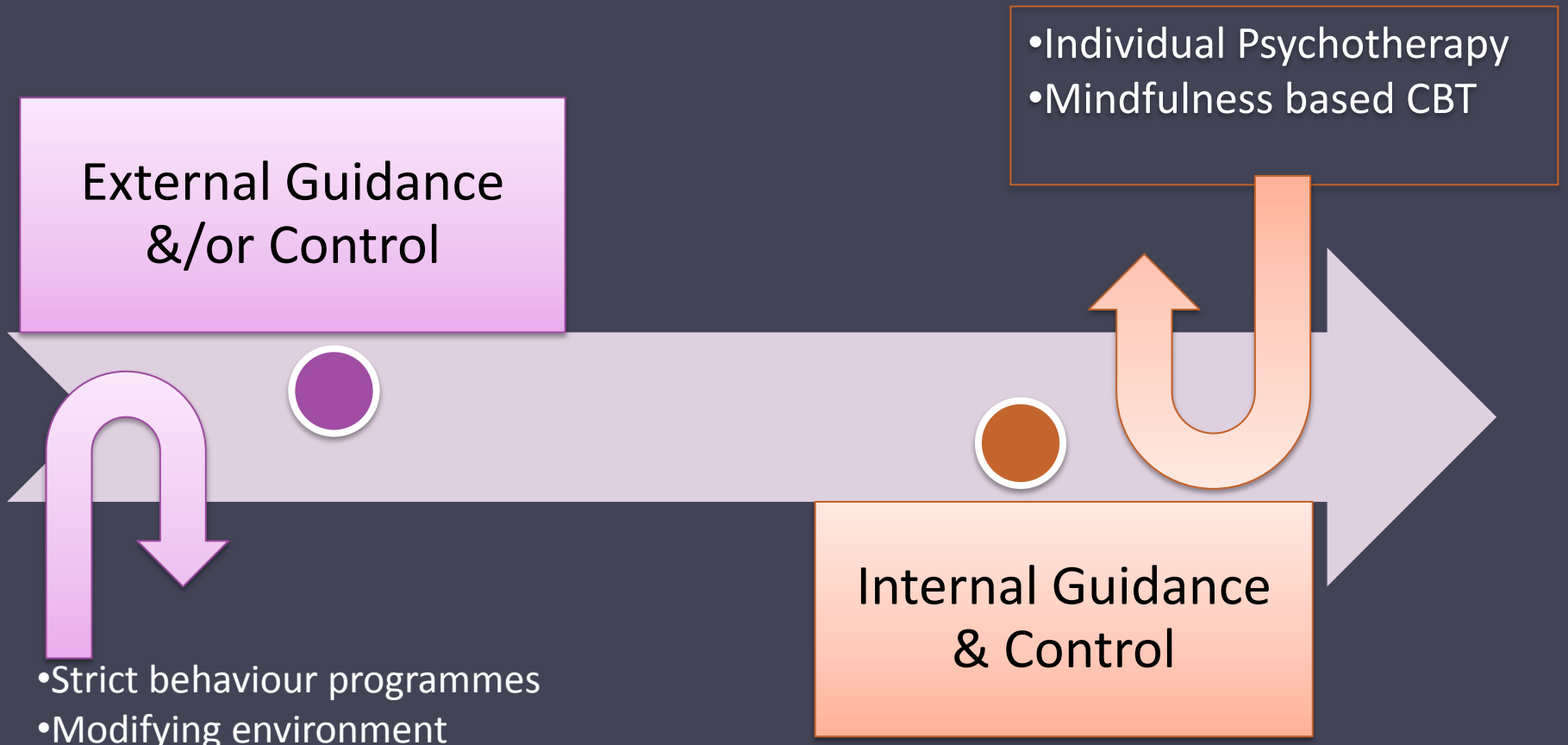
All **short term** strategies are designed to **lighten the load** on the EF system

Long term strategies: strengthening the EF system & building a **repertoire of effective self management skills** to compensate for EF weaknesses

Figuring out how to help begins with clearly & specifically **defining the problem & deciding where to start**

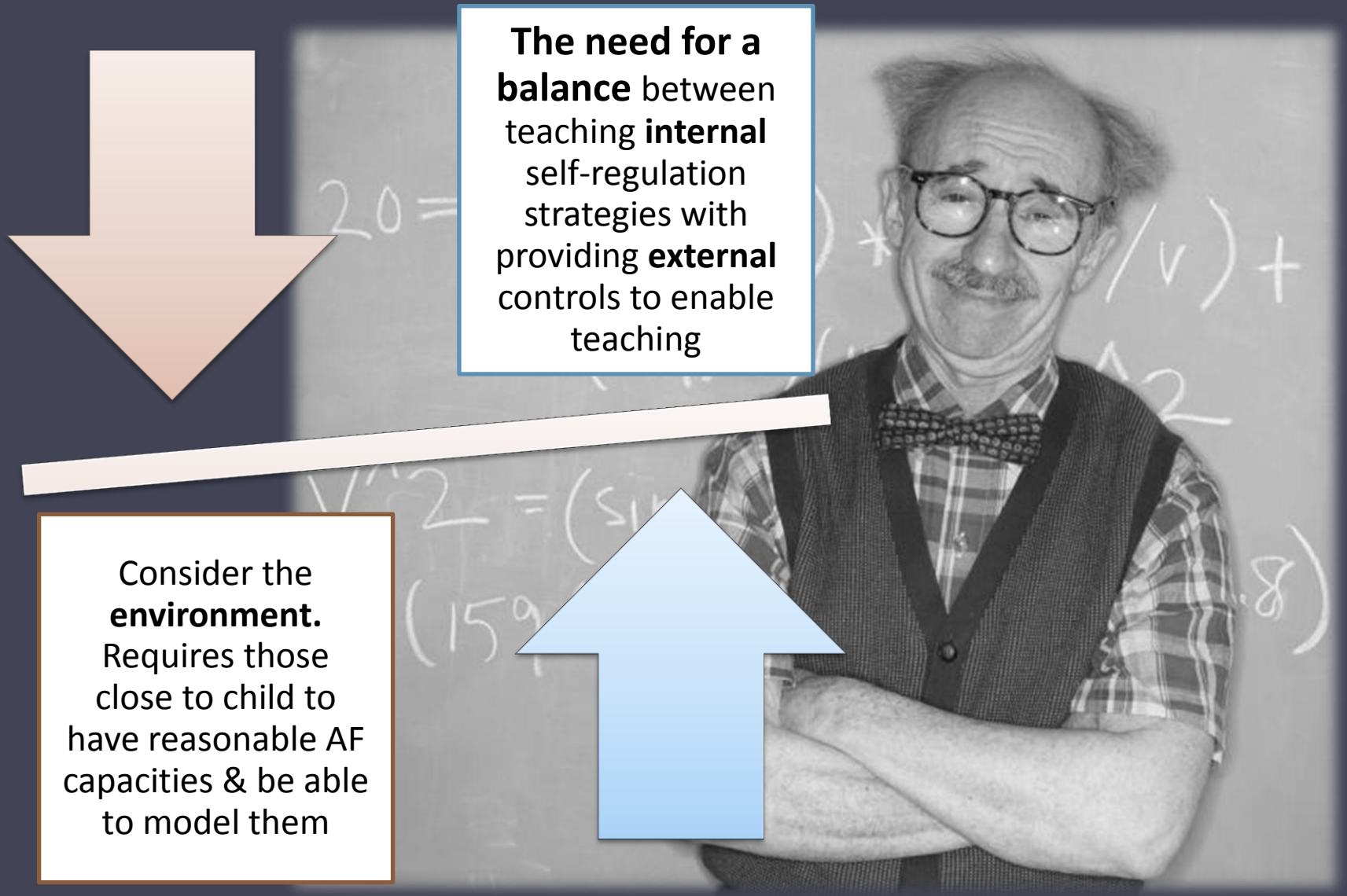
Interventions **do not come** in a **one size fits all** package. They must be tailored to the child & the setting.

Continuum for EF Interventions (McCloskey, 2009)



Self-Awareness/Activation/Control/Self Regulation/Determination/Sense of self

EF interventions *requires:*



The need for a balance between teaching **internal** self-regulation strategies with providing **external** controls to enable teaching

Consider the **environment.** Requires those close to child to have reasonable AF capacities & be able to model them

Behaviour change

(From Cooper-Kahn & Dietzel,2008)

Kids are more likely to be successful when we teach using real life tasks rather than trying to teach skills in the abstract

Teaching new skills to kids with EF weaknesses may require a different approach than other children

Natural consequences & typical behavioural interventions may not be effective

Change happens in small steps, not giant leaps. It is important to recognise the effort & accomplishment involved in even small steps if they are moving in the right direction.

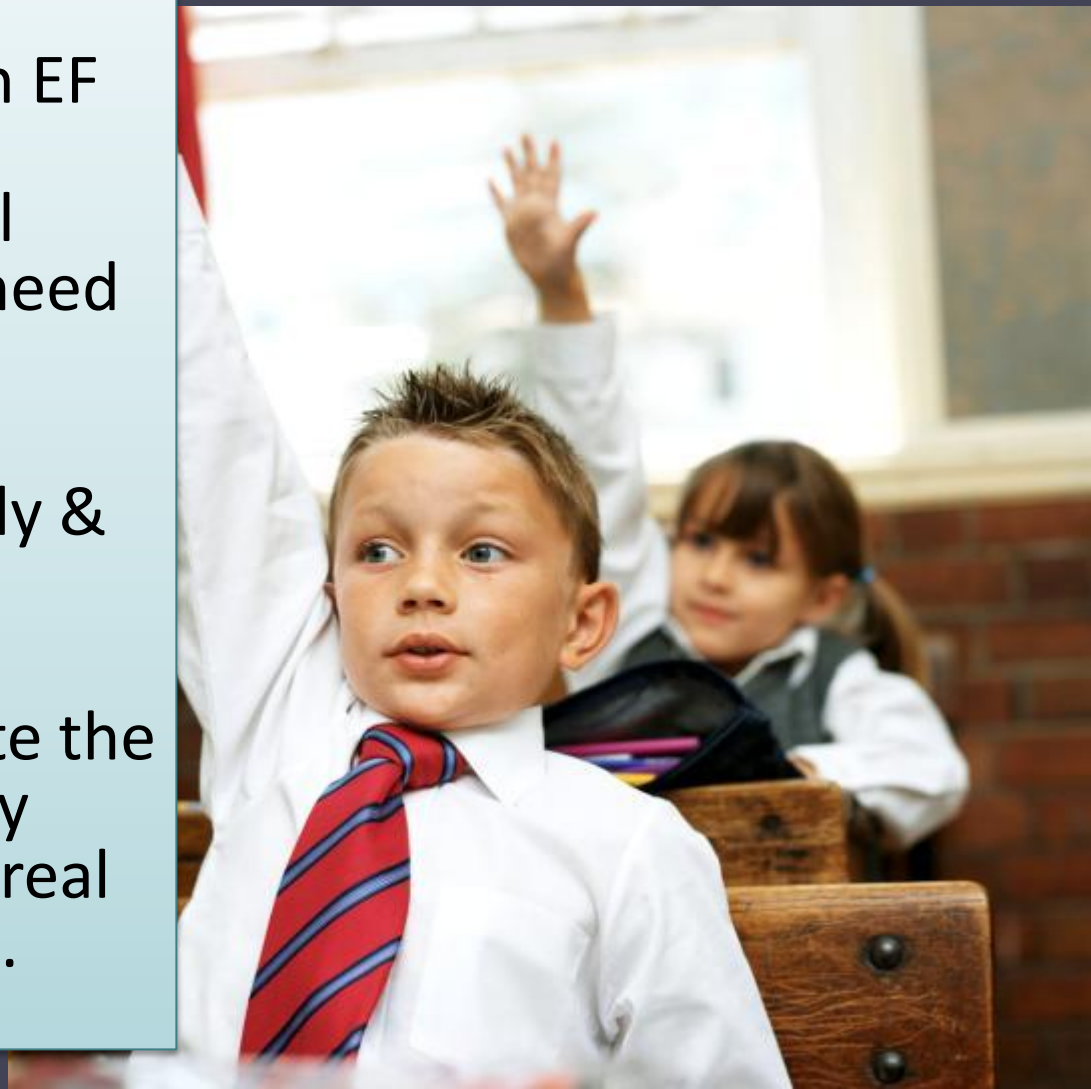
Rewards & Punishment

Can be useful but:

- They don't teach self-awareness
- It is often not about *motivation* but a *skill deficit*

“Moving the Frontal Lobe to the Front of the Class” 7 Core Strategies (Kaufman, 2011)

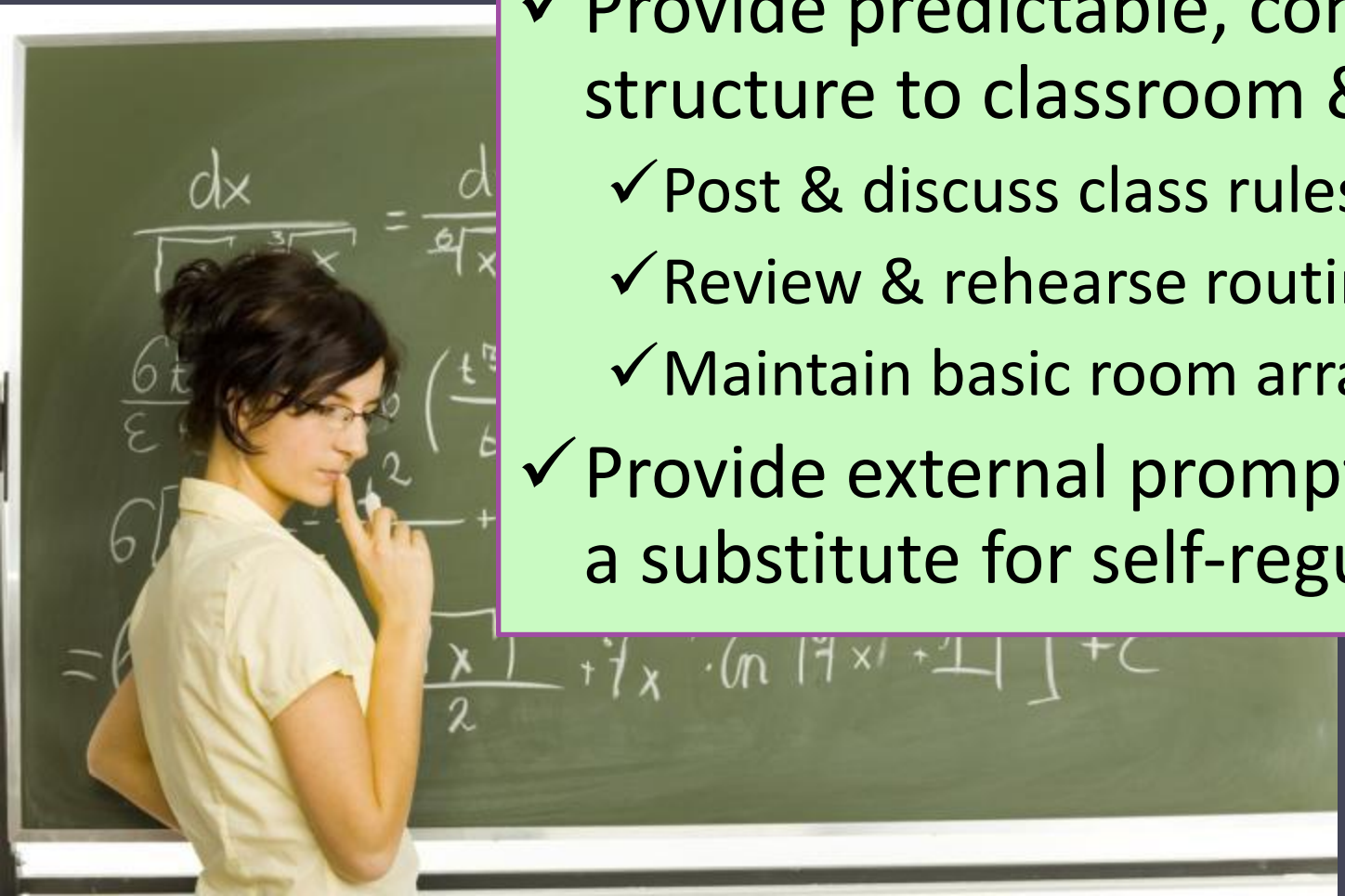
1. Provide children with EF weaknesses with the “Surrogate Prefrontal Lobe” support they need to succeed.
2. Teach new skills & content systematically & explicitly.
3. Teach strategies & explicitly demonstrate the manner in which they should be applied in real life learning contexts.



“Moving the Frontal Lobe to the Front of the Class” 7 Core Strategies (Kaufman, 2011)

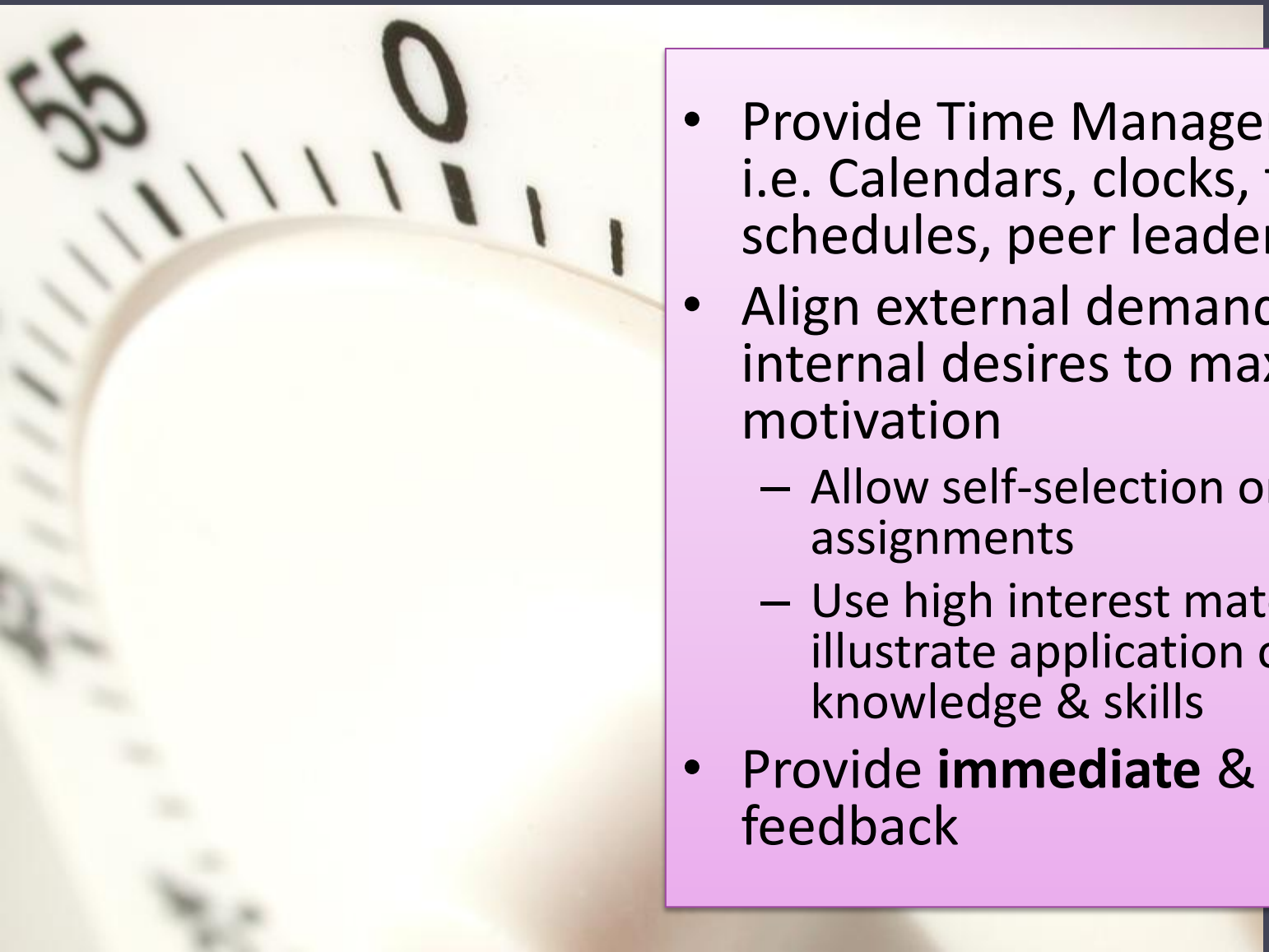
4. Minimise demands on working memory (limit simultaneous processing load)
5. Provide many opportunities for guided, extended practice.
6. Keep things as predictable & consistent as possible
7. Anticipate the aspects of tasks & situations students might find threatening or frustrating & model strategies to manage these challenges when they occur

Strategies for providing external guidance



- ✓ Provide predictable, consistent structure to classroom & routines
  - ✓ Post & discuss class rules & schedules
  - ✓ Review & rehearse routines
  - ✓ Maintain basic room arrangement
- ✓ Provide external prompts & cues as a substitute for self-regulation

Strategies for providing external guidance



- Provide Time Management aids i.e. Calendars, clocks, timers, schedules, peer leaders
- Align external demands with internal desires to maximise motivation
  - Allow self-selection or choice of assignments
  - Use high interest material to illustrate application of new knowledge & skills
- Provide **immediate** & frequent feedback

Using EF Prompts in the classroom

McCloskey, Perkins & VanDivner (2009)

Focus: “Pay attention to what happens when...”

Sustain: “You will need to watch the computer screen”

Flexible: “It doesn’t need to be done exactly the same way each time”

Inhibit: “Don’t start until I tell you to go”

Using EF Prompts in the classroom

McCloskey, Perkins & VanDivner (2009)

- Energise
- Initiative
- Inhibit
- Modulate
- Gauge
- Focus
- Sustain
- Stop
- Interrupt
- Flexible
- Shift
- Hold
- Manipulate
- Organise
- Anticipate
- Plan
- Generate
- Analyse
- Compare
- Choose
- Balance
- Store
- Retrieve
- Pace
- Sense Time
- Estimate Time
- Sequence
- Execute
- Monitor
- Correct

Strategies for developing internal control

- ✓ Model appropriate use of self-regulation EF
- ✓ Teach self-regulation capacities as specific skill routines using cognitive strategy instruction approaches (e.g. Meltzer, 2010)
- ✓ Develop nonverbal symbols for signifying self-regulation
- ✓ Model & encourage self-talk
- ✓ Model & teach use of self-administered rewards

Other approaches

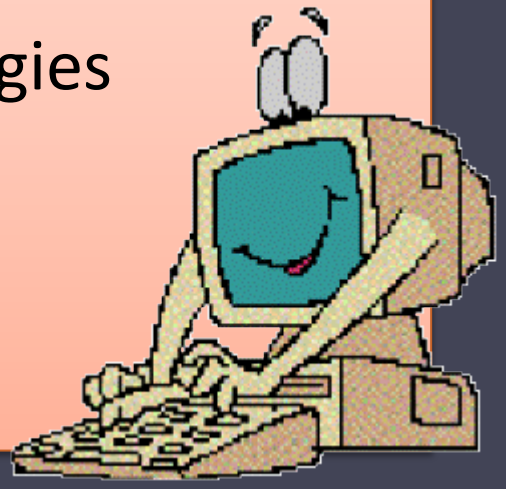
see review by Karbach, J. & Unger, K. (2014) Executive control training from middle childhood to adolescence. Frontiers in Psychology, 5, 1-14.

Computer based training

- Cog Med for working memory & reasoning
- Computer & interactive games
- Task switching computer based training

School based curriculum

- Promoting alternative thinking strategies
- Chicago School Readiness project
- **Tools of the Mind**
- **Montessori curriculum**



Other approaches

Aerobics

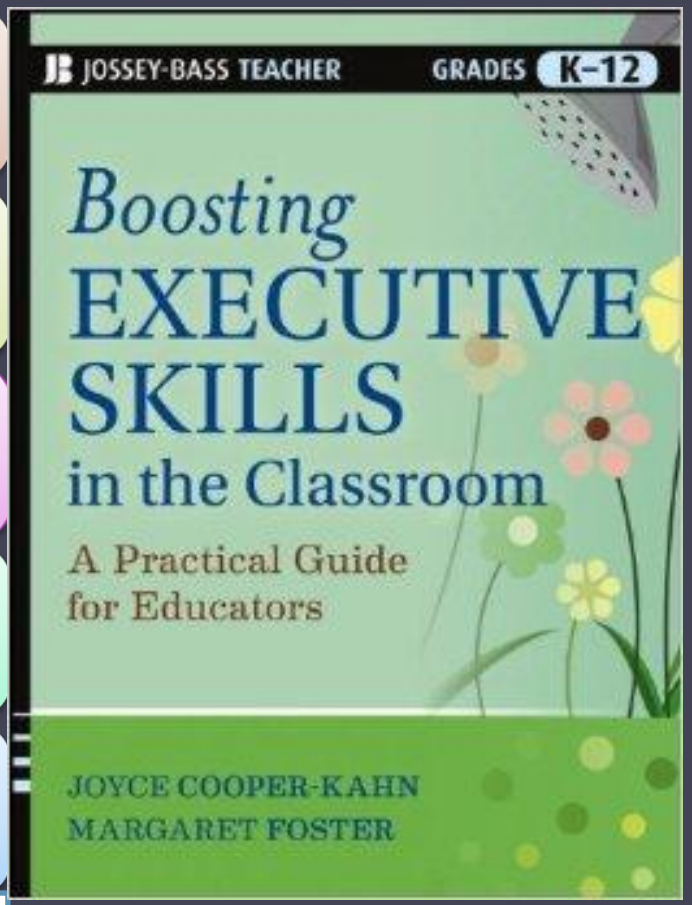
Martial arts e.g. Traditional tae kwon do better than modern type

Yoga

Mindfulness

Strong evidence of exercise-linked benefits (Guiney, & Machado, 2012 related to:

- Task switching
- Selective attention,
- Inhibitory control
- working memory capacity



Smart Apps to Aid EF

http://www.smartappsforspecialneeds.com/2013/12/why-cant-you-be-more-organized-10-apps.html

http://www.spectronics.com.au/blog/apps-and-mobile-learning/using-ipads-and-other-devices-for-executive-functioning/

https://educationalappsforall.wordpress.com/category/executive-functioning-apps/

http://www.graphite.org/blog/9-best-apps-and-sites-to-improve-executive-function

http://kooltools4students.weebly.com/at-and-executive-functioning.html

http://www.tregoed.org/teachers/about-scan.html

Repeated Practice is important

Outcome measures need to test the limit of the child's abilities to see a benefit from training

Social, emotional & physical health is important because EF's made worse by poor sleep, loneliness, lack of exercise

see review by Diamond, A. (2012). Activities & programs that improve children's executive functions. *Current Directions in Psychological Science, 21(5),* 335-341.

Recommended Reading

Cooper-Kahn, J., & Dietzel, L. (2008). **Late, Lost, and Unprepared. A Parent's Guide to Helping children with Executive Functioning.** Woodbine House: US.

Dawson, P., & Guare, R. **Coaching students with executive skills deficits.** NY: Guilford Press.

Dawson, P., & Guare, R. (2010). **Executive skills in children and adolescents. A Practical guide to assessment & intervention.** NY: Guilford Press.

Dawson, P., & Guare, R. (2009). **Smart but Scattered.** NY: Guildford Press.

Diamond, A. & Lee, K. (2011). **Review: Interventions shown to aid Executive Function Development in Children 4-12 Years old.** Science, 333, pp. 959-964.

Fine, A., & Kotkin, R. (2003). **Therapist's Guide to Learning and Attention Disorders.** USA: Elsevier Science.

Kaufman, C. (2010). **Executive function in the classroom. Practical strategies for improving performance & enhancing skills for all students.** USA: Paul H Brookes Publishing.

McCloskey, G., Perkins, L.A., & Van Divner, B. (2009). **Assessment and Intervention for Executive Function Difficulties.** Taylor & Francis: NY.

Richard, G., & Fahy, J. (2005). **The Source for Development of Executive Functions.** USA: LinguiSystems.


Questions?
Eight Silly Monkeys
A Fine Fellow for Rufus
Jane